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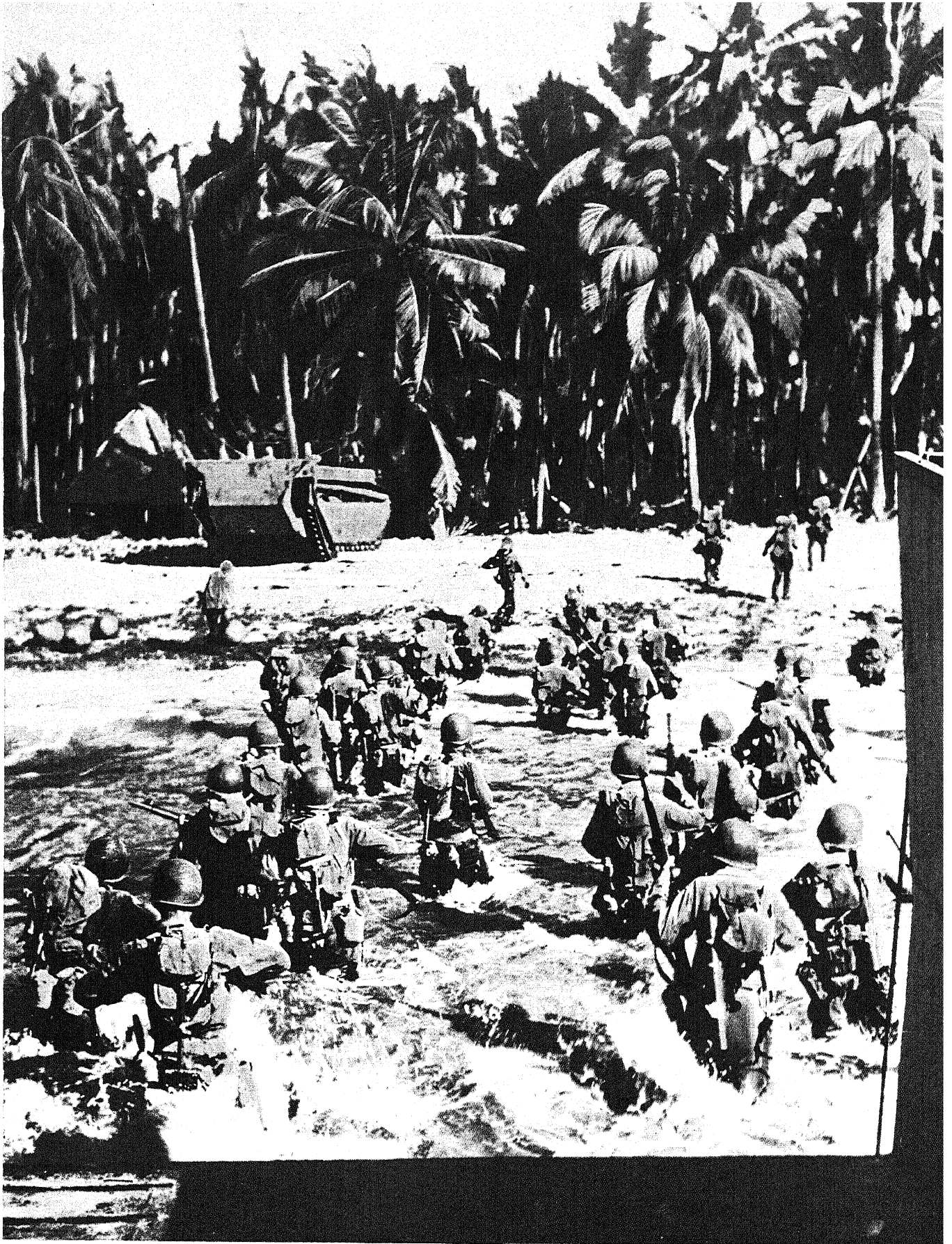


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10 **EVENTFUL YEARS**



Invasion of Cebu, Philippines, 1945

10

Eventful Years

VOLUME THREE

LIBERALISM

to SCRAP

**A RECORD OF EVENTS
OF THE YEARS PRECEDING
INCLUDING AND FOLLOWING
WORLD WAR II**

1937 THROUGH 1946

Prepared Under the Editorial Direction of

WALTER YUST

Editor of Encyclopædia Britannica



The University of Chicago

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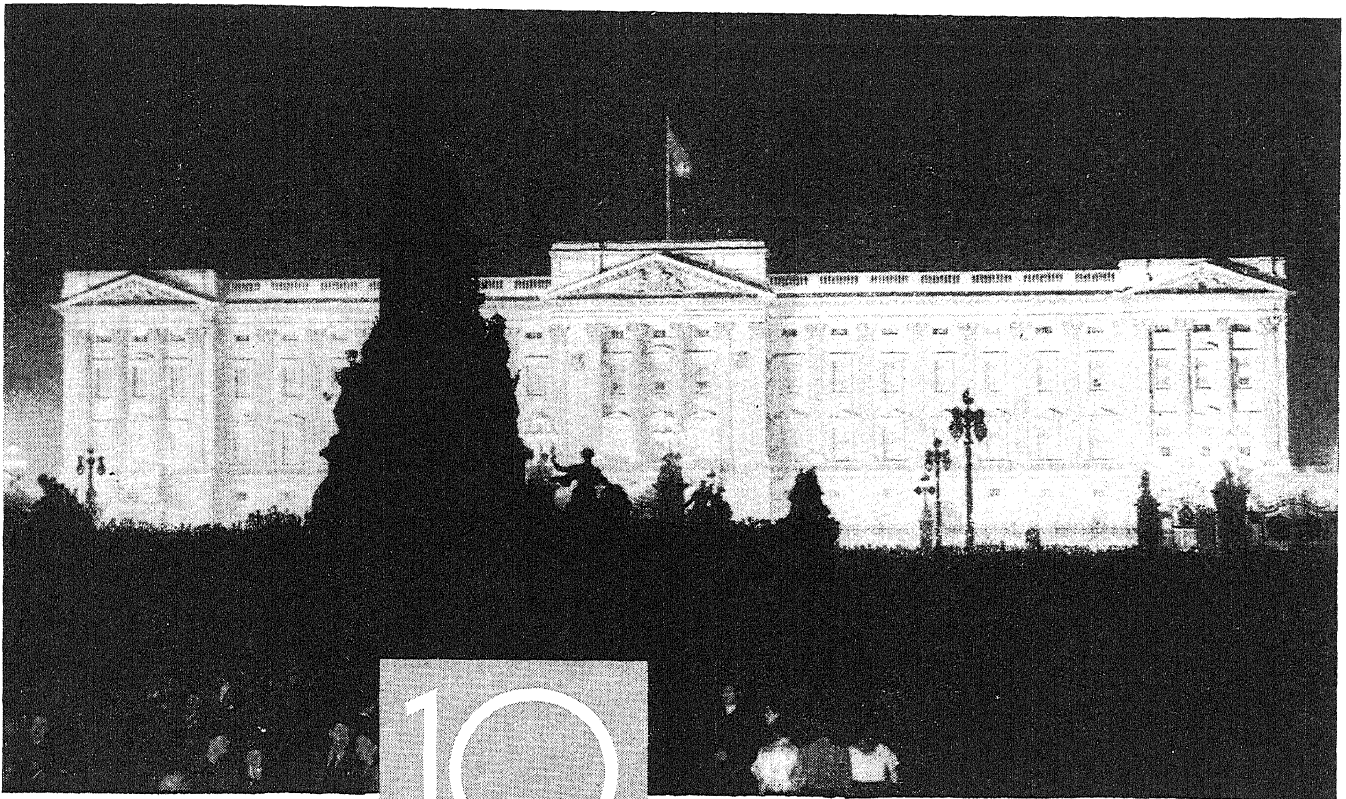
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L liberalism

The circumstances of the decade which ended with the establishment of the United Nations organization were decidedly adverse to the survival of liberalism in the 19th century sense. Practically all states which took part in World War I had followed the trend toward centralization in domestic, and force in foreign affairs. Freedom of enterprise, in the world economic depression, was decreasingly accepted as a norm of policy, and free trade lost many of its former exponents in theory as well as practice. Disarmament dropped out of sight even as an ideal, and international peace ceased to be thought of in terms of what was fashionably called appeasement. Yet the term liberalism retained its popular appeal. It was invoked by very varied schools of opinion to denote a position somewhere in between the status quo of the pre-Roosevelt era and the kind of collectivism that could be called, by its opponents, totalitarian. To some extent the word democracy fulfilled this function; but since, during World War II this term was claimed by the Russian, the Spanish and even the Chinese governments, the word liberalism became the residuary legatee. Its prestige was directly related to its ambiguity; and this fact called forth a flood of controversial writing in which the proper meaning of the term was debated.

What is Liberalism?—In academic circles the discussion gained momentum from the current efforts, rapidly increasing during and after the war years, to redefine the function and curriculum of the liberal arts college. In general these efforts were directed to a more coherent integration; and the quest encouraged a re-examination of liberalism's first principles in terms of their historic origins. A good example was J. S. Bixler's *Conversations with an Unrepentant Liberal* (Yale University Press, 1946), in which two contemporaries of Plato continue to philoso-

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phize, largely in Platonic terms, in and upon the modern U.S. scene. The essence of liberalism is represented (Plato to the contrary notwithstanding) as freedom of utterance, tolerance of conflicting opinions and devotion to rational analysis as the sole ground of truth and universality. This applies to religion as well as to ethics and politics. "Religion is active, devoted, and loyal commitment to the best that we can discover, and the best can be discovered only by using our reason for all that it is worth." The kind of reason intended is "that which we know as a principle of coherence, a set of logical relationships which judges life and provides rules for it." This faculty is a better ground of universality than the special insights claimed by any religion, including "the particularistic features of Christianity." The author's position is thus radically anti-authoritarian; and liberalism in education becomes an apotheosis of the method of free enquiry.

In this interpretation Bixler was supported by Morris R. Cohen, who wrote in *The Faith of a Liberal*, "The open eye for possible alternatives, each to receive the same logical treatment before we can determine which is the best grounded, is the essence of liberalism in art, morals, and politics." (*The Faith of a Liberal* by Morris R. Cohen, copyright, 1946, by Henry Holt and Company, Inc.) Critics of this identification of liberalism with pure rationality could, however, protest with some reason that it is too academic, or aristocratic, a principle to be of much effect as a guide to political action. The attitude of suspended judgment may suffice on the bench or the rostrum, but the business of life consists largely in coming to conclusions. It was this fact that gave the empiricism of John Dewey so wide a vogue in the United States. Bixler scored a point when he argued against Dewey in his book cited above that the determination of what is really useful

demands a priori criteria. The point was, however, an academic one; for the pragmatic liberalism of Dewey attained its popularity because it expressed in quasi-philosophic terms the propensity of a pioneer people to act first and reflect afterwards.

Christian Liberalism.—Those to whom both the rationalistic and the pragmatic solutions seemed inadequate were inclined to pursue the analysis on historical lines from the Greek to the Christian synthesis. Thus, W. A. Orton, in *The Liberal Tradition* (Yale University Press, 1945) emphasized the Aristotelian rather than the Platonic elements in western thought, and attempted to show, by both historical and analytical exegesis, that the ultimate foundations of the philosophy of freedom are transcendental. "The fundamental values of the liberal tradition were in fact exemplified, formulated, and wrought into the texture of Western society by Christianity, not only as a school of thought, but as a way of life and feeling: as religion, in short." This position was corroborated by the Catholic historian Christopher Dawson, in *The Judgment of the Nations* (Sheed and Ward, Inc., 1942): "Religion was the source of the moral standards and spiritual values which are essential to the liberal tradition, though liberals frequently ignored this and attempted to base them on abstract ideas. But the rational ideas of liberalism were abstracted from a historical religious tradition, and the liberal culture was strongest and most enduring precisely in those societies in which the Christian social and political consciousness was most alive."

These and other Catholic writers represented, on the whole, the liberalism of Lord John Acton, whose dictum that liberty is the highest political objective carefully implied that there are other and more positive ends, of which political liberty is an essential pre-condition. Their historical perspective, however, was to some extent shared by leading Protestant liberals, prominent among whom was Reinhold Niebuhr. Niebuhr, like Bixler, rejected the authoritarian elements of Catholic tradition; the individualism of his religious philosophy was in curious contrast to the societal bent of his political ethics; but he was emphatic in rejecting purely secular criteria of "progress." Indeed, the notion of secular progress embodied in Ramsay Muir's definition of liberalism ("A belief in the value of human personality, and a conviction that the source of all progress lies in the free exercise of individual energy; it produces an eagerness to emancipate all individuals or groups so that they may freely exercise their powers, so far as this can be done without injury to others; and it therefore involves a readiness to use the power of the State for the purposes of creating the conditions within which individual energies can thrive, of preventing all abuses of power, of affording to every citizen the means of acquiring mastery of his own capacities, and of establishing a real equality of opportunity for all.") was relegated, for what it was worth, almost exclusively to the Marxists.

The historical analysis of liberalism by Christian scholars necessarily involved the evaluation of individualism as an element in the liberal tradition. Here the differences between Catholic, Anglican and Protestant writers, especially in their treatment of Martin Luther and John Calvin, followed the lines one would expect; but even in the extreme Protestant sects of the United States the emphasis on the individual was yielding priority to the concept of community, and the application of positive moral criteria to the actions of organized society made conspicuous advances—at least in theory. This was the more noteworthy

in that the leading exponents of *laissez-faire* in the 19th century United States rested their case to a much greater degree than generally remembered on Protestant ethics. From Francis Wayland to J. B. Clark the basis of individualist economics was far more religious than in contemporary England; and the work and writings of Herbert Hoover reflected much that was finest in this school of thought. The career of R. B. Ely (1854–1943) was an instructive record of the transition from an individualist to a social standpoint in economics within the framework of a positive Christianity. In this connection it is relevant to recall the strong support given to the policies of Lloyd George in the years 1906–11 by what was then called "the non-conformist conscience." There can be no doubt that a parallel development occurred in the United States a generation later. The activity of the Federal Council of Churches in social and international matters, despite the doctrinal divergencies between its 40-odd constituent organizations, amounted on the whole to a significant demonstration of Christian liberalism. In England and western Europe the application of Christian principles to both domestic and international problems evoked a degree of religious co-operation that might prove to be of great significance to the future of liberalism; but in the United States the vigorous attack waged on the Roman Catholic Church by both Protestant and secular groups of the political left discouraged any such expectations.

Liberalism and Rome.—A further difficulty arose from the little-understood fact that, as Father J. J. Scanlon, S.J., reminded the U.S. press in 1946, the church uses the term liberalism "in a special technical sense." Particularly in the United States this sense is almost exclusively the continental one which Pius IX and his immediate successors so emphatically denounced. In this connotation the term liberalism harks back to the French encyclopaedists and Freemasons (Grand Orient) and becomes synonymous with individualism, rationalism (so-called), agnosticism and materialism. In this, as in so many other respects, U.S. usage follows French rather than English precedent. An important study by E. J. Hughes, *The Church and the Liberal Society* (1944) was a case in point. The author's attack on liberalism takes its weapons equally from the popes and Professor Harold Laski; there is no reference to Acton, John Bright, Richard Cobden, L. T. Hobhouse, A. Marshall or other great exponents of English liberalism, and William Gladstone is mentioned only for his dislike of the Syllabus of Errors. So understood, or misunderstood, liberalism is saddled with the blame for the chronic economic crisis and a couple of world wars; but what the author boldly terms "the collapse of the Liberal Society" is simply the breakdown, in both theory and practice, of modern utilitarian *laissez-faire*. To represent this as the whole content of liberalism is plausible only because of the desuetude of the classical culture from which liberalism drew its philosophy of freedom.

There is, of course, abundant evidence, especially in Marxist writers, to support the narrow view; but it is far from constituting the whole case, and there would seem to be both room and need, in the postwar period more than ever, for an accredited term to denote the position which rejects both toryism and state-centred collectivism. Such a position may reasonably be held to rest on Christian foundations; and the courageous and dynamic teaching of Pope Pius XII, particularly in his exposition of the role and responsibilities of private property and economic power in the modern social order, was such as to command the attention of liberals of every persuasion. The rise in Europe of avowedly Christian parties which rejected both

individualism and Marxism was among the most significant political phenomena of the postwar period; and it is permissible to ask why, if the term Christian socialism had won a certain measure of acceptance, the term Christian liberalism should not make a bid for general currency.

Neo-liberalism.—Whether that expression could apply to modern U.S. liberalism was, however, doubtful, since so large a proportion of its exponents were either non-Christian or anti-Christian. Again, the situation was in sharp contrast to that of English liberalism, some of whose stoutest defenders now rested their case on Christian grounds: an interesting reversal of roles. Francis Neilson, formerly editor of *The Freeman*, argued vigorously in the 1940s for a revival of both the name and the substance of political radicalism: a tradition of which he was a gallant, if somewhat lonely, exemplar. The term radical, however, had lost its popular appeal, probably because of its strongly individualist associations. U.S. liberalism, or neo-liberalism, as it was coming to be called, was radical in the sense of being anti-traditional, but it was also becoming more and more collectivist.

Few works had more influence in this direction than H. J. Laski's *The Rise of Liberalism* (Harper & Brothers, 1936). In this able and well-documented study, liberalism is represented as rooted in the 17th century conception of private property, and as owing both its political and its economic success to the desire of the owning minority to make the most of it. Many liberties of permanent social value resulted; but there was a fatal flaw. "The individual liberalism has sought to protect is always, so to say, free to purchase his freedom in the society it made; but the number of those with the means of purchase at their disposal has always been a minority of mankind." To present this half-truth as the whole story is possible only through the gentle art of omitting evidence. The depiction of liberalism as, in the end, nothing more than the self-interest of the bourgeoisie rests frankly on the materialist interpretation of history and the class theory of society. It was therefore generally accepted by those who were willing to follow Professor Laski at least part of the way to Moscow. Thus Max Lerner, perhaps the outstanding spokesman of U.S. neo-liberalism, wrote in 1938 (*It Is Later Than You Think*, The Viking Press, Inc., 1938, 1943): "There is a new type of liberal emerging—the democratic collectivist. His leanings are leftward, toward a broadened base of government and culture. His aim is to reassert for the contemporary world the aims of the liberal movement of the seventeenth and eighteenth centuries, but to do it on the base of the newly emerging class of today that corresponds to the emerging capitalist class of that day. His economic program is one of democratic socialization." From this standpoint the traditional economic liberalism of Justices Oliver Wendell Holmes and Louis Brandeis, like that of Herbert Hoover and Robert LaFollette, Sr., was definitely out of date, and those who defended it were regarded as reactionaries.

Nonetheless, it had its defenders, in a very important sphere of U.S. policy. The attack on combines and cartels so vigorously waged by the department of justice in the 1940s embodied a faith in free competition and a dislike of concentrated economic power that was applauded equally by midwestern progressives and urban opponents of capitalism in general. The spirit of 1890 was obviously very much alive; but it was somewhat hard to reconcile with the increasing reliance on state control, state subsidies, state benefits and state enterprise that neo-liberalism took over from the New Deal. The dilemma was aptly illustrated by Thurman Arnold, former attorney general of

the United States, in a statement published in *The New Republic* of July 22, 1946. Arnold denounced "those so-called liberals whose principal social value is security for the underdog, rather than opportunity for the individual. For example, one of the most popular liberal causes is strong labor organizations. Many liberals would fight for every strong labor organization until it became a force which restricted production, throttled new enterprise, prevented individual collective bargaining by local units and destroyed democracy in labor. At that point, they would seek to curb it by strong government action. The pro-underdog liberals rely on super-organizations of labor and government, under the delusion that dictatorial power will be used reasonably if it is preached at and cajoled."

Here the essential question is raised: how far is liberalism, in any legitimate sense of the word, compatible with the increasing aggrandizement of the state for even the best of purposes? Not at all, was the answer given by a small but powerful group of writers who saw freedom itself imperilled by the growing statism of the modern world. Prominent in this group was F. A. Hayek of London university, whose book *The Road to Serfdom* (1944) produced a very sharp debate. Hayek's defense of the free competitive economic system owed much to the work of his former colleague in the University of Vienna, Professor R. von Mises, whose *Bureaucracy* (1945) gave a broad general backing to the thesis. Their case was supported by other economists, including Henry Hazlitt and Professor Lionel Robbins, who, while not as inflexible as the two first-named, argued the superiority of a voluntary to a controlled economic order. The argument asserted that once the principle of free competitive pricing is abandoned, all decisions as to the distribution and production of goods and services become arbitrary; i.e., dependent on the *a priori* opinions of some person or group who must necessarily enforce their own ideas because there are no longer any objective criteria. There is no denying the faults and follies of free enterprise guided by the quest for profits; but it is submitted that even if government were all-wise and perfectly disinterested, the dethronement of the "consumer as king" would entail a loss of freedom for which nothing could compensate, and nothing could disguise.

Here we have a distinct echo of Herbert Spencer's attack on the type of radical who "seems under the impression that so long as he has a good end in view he is warranted in exercising over men all the coercion he is able." And it is interesting to recall Spencer's forecast: "The function of Liberalism in the past was that of putting a limit to the powers of kings. The function of true liberalism in the future will be that of putting a limit to the powers of Parliaments." (From *The Man Versus the State* by Herbert Spencer. Published by The Caxton Printers, Ltd., Caldwell, Idaho. Used by special permission of the copyright owners.)

The challenge thus thrown to the neo-liberals was also related to the controversy about deficit financing as preached and practiced by the followers of Professors John Keynes and A. H. Hansen. The contention that public debt is essentially different from private debt, and may properly be manipulated with the cardinal aim of controlling the economic life of the nation, tended, whatever its merits, to strengthen the cause of the statists. On the opposition side were ranged such veteran financial authorities as J. T. Flynn, H. H. Moulton, and Garet Garrett; but they had to cope not only with the technical arguments advanced, but with the fact that deficit financing was one of the tools

relied on by the advocates of the "full employment policy." In this policy it is the duty of government to ensure that at all times anyone who wants a remunerative job can find one (there was a curious lack of reference to France in 1848) and if necessary to provide the job itself. This policy in turn reinforced the demand for a "planned economy"; and the appeal of the planned economy resided not only in the promise of full employment, but in the very reasonable contention that government control could provide, or command, a more desirable assortment of goods and services than the voluntary system. What such planning would mean was clearly indicated by Max Lerner, in his book cited above, in terms that Sir William Beveridge would have entirely endorsed: "Democratic planning may be defined as the technical coordination, by disinterested experts, of consumption, production, investment, trade, and income distribution in accordance with social objectives set by bodies representative of the majority." One may ask what happens to the minority, and how large or small it is supposed to be; one may make mental reservations about the supply of "disinterested experts"; one may speculate as to what will happen when the opinions of the experts as to what is feasible conflict with the demands of the majority for what it deems desirable—such as simultaneously more benefits and lower taxes: the fact remains that this ideal is especially attractive to a pure democracy in which most people imagine that it is only a minority that will be marshalled and mulcted; and the decisive question for liberals is simply whether the price is too high. The issue is confounded by the insistence of both proponents and opponents on calling themselves liberals.

British Liberalism.—The issue came to a head in the British Liberal party's campaign of 1945. At its Feb. conference the party had officially adopted—not without strong dissent from such older liberals as F. W. Hirst—the so-called second Beveridge Report (*Full Employment in a Free Society*); thus categorically reversing the opposition to a "planned national economy" officially expressed as recently as 1942. In Sir William Beveridge's ambitious project for the welfare state, the full employment thesis was unreservedly adopted and it was declared that "the State cannot undertake responsibility for full employment without full powers." All major economic decisions are assigned to the government, including the level of prices and wages, the quantity of savings and the employment of private capital. It becomes the primary business of the state at all times to ensure "adequate total outlay," and "under the conditions envisaged in this Report, probably not more than 25 per cent of the total national investment will be accounted for by private manufacturing industry." The future of free initiative, and the opportunity for venture capital to create, own or manage new facilities, are left on the knees of the gods (or the experts); for while Sir William pays perfunctory homage to the customary political liberties, his list "does not include liberty of a private citizen to own means of production and to employ other citizens in operating them at a wage. Whether private ownership of means of production to be operated by others is a good economic device or not, it must be judged as a device." (Material in quotation marks is reprinted from *Full Employment in a Free Society* by William H. Beveridge, by permission of the publishers, W. W. Norton & Company, Inc.; copyright 1945.) In return for this wholesale surrender of economic liberty the electorate was promised full employment and "cradle-to-grave" security;

but whether the program could pass muster as liberalism was open to question. Apparently the voters thought not, to judge from the disastrous defeat of the Liberal party in the July 1945 elections. It would appear that people who really desired this degree of "planning" and state dependence logically voted for the Socialists, while those who did not were thrown into the Conservative camp; the Conservatives had in fact embodied a large measure of liberal economic policy in their revival of tory democracy. It would also appear, from a comparison of the voting returns with the membership of the new house of commons, that the country as a whole was not nearly so collectivist as the leaders of the Liberal party in 1945 had assumed. The party polled, on the Beveridge platform, a mere 10% of the popular vote; it is a safe guess that it would have done at least as well, and probably better, on a platform more consonant with strictly liberal principles. Once again, the false assumption that the only practical alternatives are statism and *laissez-faire* amounted to a betrayal of liberalism.

Liberalism and Foreign Policy.—With the liberal distrust of the state so largely undermined, in both theory and practice, on the domestic front, developments on the international front during and after World War II gave even less encouragement to short-run optimism. It could hardly be denied that the doctrines of free trade and nonintervention are cardinal to the liberal tradition; but in this sphere also "neo-liberalism" showed itself willing to make fateful concessions.

The wave of economic nationalism launched in the 1920s, heightened by the U.S. tariff of 1930, overwhelmed the last vestiges of British free trade in 1932. The policy of bilateral agreements won the support of many British liberals as the second-best, but only practicable, alternative; and the consolidation of the sterling area had its merits as an alternative to isolation. In the United States the Hull policy of reciprocal trade agreements embodying the most-favoured nation clause was both too little and too late to stem the restriction of free economic intercourse; and through the 1940s Britain waited in vain for a general reduction of tariff barriers on the part of the world's great creditor nation. Since national states superseded private persons as the principal bargaining agents, considerations of national power and interest increasingly controlled the course of events; in a changing world these had never led to stable or harmonious combinations, nor was there any reason to suppose that they would. During and for some time after the period of military hostilities, the use of unrestrained economic coercion against both neutral states and private firms operating in neutral countries left little vestige of either public or private international law as such law had previously been understood. The struggle of the rival power systems dominated all important decisions, and the assumption of the San Francisco charter that justice and the will of the big powers would coincide merely raised the question as to how justice would fare when the big powers failed to agree.

Law as the will of the stronger had never been a liberal conception, because it lacks inherent universality. There are times and occasions when it acquires circumstantial justification, on the assumption that any order is better than none; but from the practical as well as the ideal standpoint all order must be judged according to whether it releases and fosters, or thwarts and threatens, free human potentiality. In the endless task of adjusting rival group interests, a looser system may therefore be preferable to a tighter one. The Franco-U.S. tendency to extend quasi-legal procedures over the sphere of political and diplo-

matic operations is of doubtful validity, and the opening it affords to endless coercion, while attractive to academic minds, is in fact no short cut to harmony. Law for the liberal must always rest on truths that are self-evident; *i.e.*, such as to win the voluntary assent of all enlightened men. That is the basis of both the Roman *jus gentium* and the mediaeval *jus naturale*; and the process of enlightenment, which is long and difficult, is of more promise than the process of coercion, which always looks quick and easy to the possessors of the latest lethal apparatus.

Nationalism and the nation-state were liberal causes a hundred years before, when they meant actual liberation from external coercion. They lingered as such in the mind of Woodrow Wilson, under very different circumstances. The negative case survived in a few instances; but J. Pilsudski was no Giuseppe Mazzini, and Eduard Beneš no Cobden. With the extension of technical and cultural intercourse, "the national community," says A. J. Toynbee (*A Study of History*, vol. 5, Oxford University Press) "is the social prison-house in which our modern western souls are incarcerated." The nation-state, following the precedent of other declining institutions, now tended to ossify, acting far more in a restrictive than in an emancipatory sense. The history of the decade 1937-46 gives no evidence whatever that highly centralized or collectivized states were more altruistic in their outlook than any other kind. Leagues of nation-states are likely to fail as leagues of city-states failed, and for the same reason. Liberals must therefore be sceptical of every policy that tends to increase the dependence of the masses, economically or emotionally, on a type of social organization that is clearly confronted by the writing on the wall.

It is not to the state as such, but to its increasingly monistic tendency, that true liberalism stands opposed. A healthy community informed by a common ethos develops many types of social organization and purpose. Among these the state may usefully serve a tutelary as well as a normative function, not only ensuring minimum standards of justice and decency, but demonstrating what can be done by disinterested organization in both economic and cultural spheres where other means fail. So held Adam Smith; and the rule is especially relevant where popular culture is exclusively controlled by profiteers; but only within such limits as exclude general coercion. To this British liberalism had for many years subscribed; and the varied types of public corporation successfully devised and operated in Britain may in time form the basis of that functional internationalism which is the only alternative to Armageddon. It is significant that not only in economic affairs, but in the arts and sciences, many of the world's ablest men were being confronted, and exasperated, by the obstacles placed in the way of a working world community by the fears and ambitions of the militant local units. On this front history continually repeats itself, offering the same ineluctable choice between emancipation and extinction.

In a direct democracy there is always the risk that such terms as peace, law, freedom, justice, masquerading as ends, may be in fact mere words, and being abstract may be invoked to justify means that run counter to whatever substance there is in them, since direct democracy favours passion and self-interest rather than thought. Liberals themselves are in constant danger of being seduced by abstractions. It is the paramount duty of modern liberalism to devise and propagate, in concrete form, types of supernational co-operation through which the powers and aspirations of modern man may be fulfilled in wider life rather than indiscriminate death. The task is urgent. (See

also DEMOCRACY; EDUCATION; PHILOSOPHY; RELIGION; SOCIALISM.)

BIBLIOGRAPHY.—In addition to the works mentioned in the text, the following shed useful light on various phases of modern liberalism: Sir H. Slessor, *History of the Liberal Party* (1944); F. W. Hirst, *Principles of Property* (1945); B. Wootton, *Freedom under Planning* (1945); A. J. Nock, *Our Enemy the State* (1946); R. Niebuhr, *The Children of Light and the Children of Darkness* (1944); E. Brunner, *Justice and the Social Order* (1946). (W. A. OR.)

Liberal Party, Great Britain

In the general election of 1935, British Liberalism suffered yet another in its long series of reverses.

The Liberal parliamentary party (as distinct from the Liberal Nationals who supported and were represented in the Baldwin and Chamberlain governments) were reduced to only 18 members in the house of commons. The weakness of the party machine was such that Liberal candidates had made their appearance in barely a quarter of the constituencies. It was abundantly clear that a national organization which could rely neither upon the support of the trade unions nor, to any appreciable extent, upon the assistance of the wealthy and leisured classes was grievously handicapped. Moreover, the process of newspaper amalgamation in the interwar years, which had resulted in the disappearance of many provincial newspapers of Liberal views, had made it increasingly difficult for the Liberals to propagate their views or even remind the electors of their existence.

Nevertheless, from 1935 until the fall of the Chamberlain government in 1940, the Liberal party succeeded in playing a part out of all proportion to its apparent strength and influence. This was due not to any revival of Liberal sentiment among the electors but to the performance of its parliamentary representatives. The Liberal leader, Sir Archibald Sinclair, had entered politics in the early 1920s under the aegis of Winston Churchill and had always remained in fairly close touch with his former chief. Under his guidance, the Liberal opposition became increasingly associated with Churchill's resistance to the Chamberlain policy of appeasement. They also adopted a very similar attitude toward rearmament. On a series of occasions between 1936 and 1938, they initiated debates on issues of national defense and particularly on the need for more rapid expansion of the R.A.F. The most important of these occasions was on Nov. 17, 1938, when, in an amendment to the address, they called for the immediate setting up of a ministry of supply. In the face of a hostile majority they met with little or no success. They could, however, claim that their attitude was abundantly justified by events.

At the outbreak of World War II, Sir Archibald Sinclair was invited to join the government. With the full approval of his followers, he refused. Liberals, both inside and outside parliament, were distrustful of Neville Chamberlain and doubted his capacity to prosecute the war. Sir Archibald Sinclair was the first political leader publicly to attack the manner in which the Norwegian campaign had been conducted. His speech was the prelude to the debate in the house of commons a week later which brought about Chamberlain's resignation.

In the new administration formed by Churchill, the Liberal party was represented. Sir Archibald Sinclair became secretary of state for air, while three of his followers received junior appointments. During the next five years the Liberal party became almost completely dormant.

The rank and file were often impatient at the party truce which prevented them from putting forward Liberal candidates at by-elections, and they were occasionally critical of the government's plans for postwar reconstruction. But on all matters affecting the prosecution of the war they gave consistent support to the prime minister. The only outstanding event in the party's history during this period was the adherence of Sir William Beveridge and his return to the house of commons as a Liberal member in 1944.

The collapse of Germany was followed within a few days by the end of the coalition. A general election followed for which the Liberals were ill-prepared, and they were able to contest less than half the constituencies. The result was disastrous. Not only were the Liberal members in the house of commons reduced to 12, but nearly all the leaders, including Sir Archibald Sinclair and Sir William Beveridge, were defeated at the polls. The party's 2,250,000 votes should have entitled it to substantial representation in the new parliament, but the prevailing electoral system of single-member constituencies almost invariably resulted in minority parties being considerably under-represented.

It was generally assumed in both the Conservative and Labour camps that this débâcle marked the end of Liberalism as an organized force in British politics. But the Liberals themselves, and especially the younger members of the party, stubbornly refused to accept the verdict as final. With an optimism which was remarkable in the circumstances, they set about the reorganization of their party machine and the rebuilding of their movement.

(D. M. F.)

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Liberia

A Negro republic lying on the west coast of Africa at the lower curve of the continental bulge, Liberia borders the narrowest part of the South Atlantic bottleneck and is the closest area of Africa to the continent of South America. Its area is about 43,000 sq.mi. Because of the inaccessibility of the vast, unmapped hinterland provinces, no complete and accurate census had ever been made. However, the population was variously estimated at from 1,500,000 to 2,000,000 in 1946—all Negro. About 12,000 were Afro-American (called Americo-Liberians) and comprised the aristocracy and ruling class. The remaining large majority was made up of many indigenous tribes. Except for the coastline (350 mi.) and the short boundary of Sierra Leone on the northwest, Liberia is surrounded by French territory: French West Africa on the north and east, and Ivory Coast on the southeast. It is at Liberia's southern tip that the west African coast turns sharply eastward along the Gulf of Guinea. During the decade 1937-46, the presidents were Edwin J. Barclay (Jan. 1936-Jan. 1944) and William V. S. Tubman (after Jan. 1944). The chief city and port of entry is Monrovia, the capital (pop. 10,000), situated about midway on the coastline. The towns next in size and importance, with populations of only a few hundred, are, likewise, on the coast and ports of entry. The most important of these are Robertsport, Marshall which serves primarily the U.S.-owned rubber plantations a few miles inland, Grand Bassa (also called Buchanan) and Cape Palmas. Possibly only one inland town is of size and importance worth mentioning. It is Kakata, 50 mi. from Monrovia on the Sanoquelli road. Its population is unknown since it is the stopping place of so many transients. For many

years it marked the end of the road and so became the convergence for hinterland traffic (foot) headed for the markets of Monrovia. Situated on the Du river, used by the Firestone Plantations company for shipping latex down to the coast, Kakata became a busy and thriving trading center for native, European and Syrian merchants. The coastline being flat and sandy, Liberia was deprived of a single good natural harbour. Each of the ports mentioned had only an anchorage, with the exception of Monrovia, where the U.S. government at the end of the decade was dredging the shallow though ideally shaped harbour to provide for alongside docking of the European and American ships regularly stopping there.

* * *

As THE DECADE 1937-46 opened, Liberia was emerging from the struggles and stagnant isolation of its first 90 years as a nation. Credentials had been presented to President Barclay by an economic adviser, a medical adviser (both Polish), and administrative, educational, and military advisers, all from the United States. The two Polish officials retired in 1937. A resident Hungarian physician succeeded to the medical advisership, and the functions of the economic adviser were absorbed by the U.S. administrators. In all departments some improvements were noted, but the national phobia of being made into a "pseudo-European state," voiced in official speeches and supported by the press, thwarted real progress and was gradually making futile or ineffective the efforts of all advisers except, perhaps, those of the military expert. (The U.S. financial adviser and his assistants were inviolate, being permanent and not a part of any short-term scheme of assistance.) The stalemated situation came to a sharp turning point in June 1942 with the arrival on Liberian soil of several thousands of U.S. Negro troops. They were the announcement to a world at war of a defense agreement between the United States and Liberia which had been signed in March of that year. This task force built roads and constructed airports and other installations for the use of the bomber ferry command feeding planes to North Africa, the near east, Russia, India and China. It was also important that the United States' largest source of raw rubber be protected.

The importance of Liberia's strategic location brought about a new program of assistance and development toward which the U.S. government agreed to advance \$12,500,000 for the construction at Monrovia of a port and port works which would aid in Liberia's advancement as well as provide an important U.S. naval base on the west African coast. The agreement for the port was contracted between the two governments on Dec. 31, 1943. At the request of the Liberian government, the services of several technical experts were loaned during 1945 to investigate iron deposits near Monrovia, to assist in the development of agriculture, to plan a program of public health and sanitation and to study the country's natural resources. The possibility of preparing a general plan of economic development was contingent on the result of these findings. Grants by the United States government in the realm of cultural relations were made to the Booker T. Washington institute and aid was given to training nurses for the public health mission.

The need for a military adviser had been accentuated by circumstances surrounding the quelling of a four-year revolt by the native King Nimleh in 1937 when he was captured in Oct. of that year. In that same month the American Advisory Committee on Education in Liberia (made up of representatives from each of the philan-

Liberia: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
United States		1 Liberian Dollar = \$1.00		1 Liberian Dollar = \$1.00		1 Liberian Dollar = \$1.00
Great Britain		4.80 Liberian Dollars = £1		4.80 Liberian Dollars = £1		4.80 Liberian Dollars = £1
Finance						
Gov. revenues	\$715 (£146)					
Gov. expenditures	\$837 (£171)					
National debt	\$1,483 (£303)					
Minerals						
Gold		1,902 oz.				
Crops						
Rubber		5,320 tons		7,000 tons		
Forest products						
Palm kernels		462,682 bu.				
Piassava		5,520 tons				
Exports—total	\$1,558 (£319)	...	\$4,201 (£1,042)	...	\$10,306 (£2,554)	...
Rubber	\$884 (£181)	...	\$3,524 (£874)	...	\$9,418 (£2,334)	19,120 tons
Palm kernels	\$357 (£73)	...	...	...	\$7 (£2)	7,585 bu.
Piassava	\$142 (£29)	...	\$55 (£14)	...	\$55 (£14)	858 tons
Imports—total	\$1,803 (£369)	...	\$2,714 (£673)	...	\$3,022 (£749)	...
Foodstuffs	\$355 (£73)	...	\$328 (£81)	...	\$793 (£197)	...
Metals and manufactures	\$348 (£71)	...	\$371 (£92)	...	\$266 (£63)	...
Textile fibres and manufactures	\$318 (£65)	...	\$290 (£72)	...	\$987 (£245)	...

thropic groups aiding Liberia) requested that the department of state in Washington investigate European propaganda against Liberia and the unrest stemming from the earlier suggestion that Liberia be mandated to Germany. In Nov. President Barclay, in the opening session of the legislature, stated that the native uprising headed by King Nimleh had been instigated by European powers. In Dec. 1937 Great Britain accorded full recognition to the Liberian republic. The enlarged army, the new airports and the naval base all promised greater efficiency in Liberia's defense. With the construction of the modern harbour at Monrovia well under way, 100,000 ac. of rubber plantations producing for export, a more closely coordinated plan of assistance functioning, new roads in use and intercounty air mail and passenger service, Liberia in the short decade of 1937 to 1946 strode with seven-league boots across many times that number of years in progress to a state of development which augured well a still greater place of importance.

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Liberty Ships

See SHIPBUILDING; SHIPPING, MERCHANT MARINE.

Libraries

The decade 1937-46 was one of the most significant in the history of United States libraries. It is a truism to say that World War II marked the end of an era and the beginning of a period of change. The library, no less than other educational and social institutions, was affected in many ways.

Two developments were especially noteworthy. (1) There was a greater co-operative effort in meeting common problems; previously there had been much discussion of co-operation but considerable reluctance to act except in limited fields. (2) There was a tremendous demand for books and information in spite of the withdrawal of many persons from civilian pursuits during the war years. Books were required to win the war. Thousands in the armed forces, through camp libraries for training and recreation, became aware of the value of books. This introduction to modern library service, added to the large enrolment of veterans in schools and colleges, had begun to make itself

felt by 1946. The increased use of libraries was bound to affect their growth and development.

It was encouraging to note the comparatively rapid recovery of libraries from the effects of reduced appropriations and increased use during the depression years. To what extent this recovery was owing to the prospect of war and preparations for national defense it would be difficult to say. By 1937 salaries, which had been cut in many libraries during the years from 1930 to 1935, had been restored, and in some cases increased, but in general appropriations for tax-supported libraries did not increase in 1937, 1938 and 1939 to the extent hoped for in view of the improved economic outlook. The diminishing returns from invested funds was a matter of growing concern to libraries supported in whole or in part by income from endowments. Reduced appropriations and diminished income forced retrenchment on many libraries; this meant depleted book stocks, curtailed service, and in some cases reduced salaries and unemployment. Although most of the 1938 graduates of library training schools had obtained positions by the end of the year, it was estimated in 1939 that 4% of the active librarians (12,124) were unemployed.

The forced economies of the depression years led to a fresh examination of the techniques employed with the result that many routine processes were simplified. Renewed attention was given to various co-operative efforts. The change in many chief librarianships, however, was the chief cause of the numerous surveys of particular libraries made by outside experts. These critical studies of organization and practice were on the whole beneficial. Archibald MacLeish, during his term as librarian of congress, accomplished the difficult task of a thorough reorganization of the national library.

Salaries for most professional librarians had always been distressingly low, having regard to the ability and preparation expected. From 1943 to 1946, however, it was encouraging to note that better salary schedules (in addition to cost-of-living bonuses) were reported by many tax-supported libraries. The proposed new classification and salary plans for the Library of Congress were heartening, but the plight of libraries not maintained by public funds was serious. It should be remarked, however, that such salary increases as were provided did little more than offset rising prices.

By 1942 the most serious problem was the increasing difficulty of filling staff vacancies. Men, from trained specialist to janitor, were serving in the armed forces, and both men and women left library positions for work in



industry or in government service. Staff losses in all grades were so serious that during the war years many libraries were forced to curtail activities and shorten hours. Losses were greater at the clerical than at the professional level. The situation at the end of 1946 was still critical. Inadequate salaries were largely responsible, although another factor in the shortage of trained librarians was the smaller enrolments from 1941 to 1945 in library schools. In 1946 there were perhaps 3,500 fewer trained people than there would have been had the enrolments each year merely maintained the point reached in 1940. This was closely connected with the entire question of recruitment and training, a matter that was frequently discussed by librarians during these years.

On Jan. 5, 1937, the 50th anniversary of the establishment of the first training school for librarians was commemorated. This was a School of Library Economy opened in 1887 by Melvil Dewey, then librarian of Columbia college, New York city. The 1936-37 report of the board of education for librarianship (American Library association) listed 26 schools of various types accredited by the board as meeting its standards; all were connected with teaching institutions. A total of 18,911 persons had been graduated since 1887 from all library training schools, including those no longer in existence.

In 1936-37 the total enrolment was 1,345, and the number of graduates 900. The number of students rose steadily, and reached its peak in 1940 with 2,159 in 30 accredited schools. From 1941 to 1944 the enrolment declined more rapidly than it had increased from 1937 to 1940. In 1944 there were 1,062 students registered in 34 schools. In 1945 the number had risen to 1,348—three more than were listed in 1937. In 1946 the enrolment in 36 accredited schools was 1,547. It was obvious that a shortage of trained personnel would be felt for a long time.

The growth of libraries after 1910 far outstripped progress in methods of training librarians. During the decade 1937-46 the difficulty of finding men of exceptional ability, technical competence, and experience for the chief librarianships of large libraries was evidence that a satisfactory method of selecting and training library administrators had not yet been devised, although the teaching of technical subjects had been greatly improved. Too many top positions were perforce filled by the appointment of men who, though able, lacked practical experience in the management of large libraries. The scholarship funds provided by individual schools, and the appropriations for the United States and Canada made by the Carnegie corporation from 1929 to 1942 for grants-in-aid for advanced study and research, while helpful, were not the answer to the question of how to attract superior ability. J. L. Wheeler's excellent report, *Progress & Problems in Education for Librarianship* (1946), prepared for the Carnegie corporation, summarized much of the discussion about training. Recruiting and revision of curricula were two problems that received special attention. The series of library institutes organized in 1936 and thereafter by the University of Chicago graduate library school for librarians in service proved helpful, and the published addresses were valuable contributions to professional literature.

The Carnegie corporation continued in other ways to aid education for librarianship. In 1937-38 a grant of \$250,000 was made to Columbia university to be used in

Valuable U.S. documents, were returned to public view in the Library of Congress on Oct. 1, 1944, for the first time since Dec. 1941, when they were removed from the capital for safekeeping. Here marines are shown guarding Thomas Jefferson's first draft of the Declaration of Independence

part (\$150,000) for the endowment of a professorship (the Melvil Dewey Professorship of Library Service) and in part for maintenance. In 1939, the corporation also made endowment grants to the library schools of Pratt Institute and the University of Denver, Colo.

Libraries in Wartime.—During 1940 and 1941, libraries gave much attention to the part they could take in the preparations for U.S. national defense, and also to the effect of the emergency upon their normal service. A survey of the resources of research libraries in the fields of science, technology and economics, the provision by public libraries of technical books to meet the demands of workers in defense industries, the establishment of information centres for civilian defense, co-operation with the libraries being organized in camps and elsewhere for the army and navy, were some of the special activities in which librarians were engaged. From Pearl Harbor to V-J day, U.S. libraries large and small did all in their power to further the prosecution of World War II by supplying books and information required by the armed forces, by government, by industry, and, not least, by civilians. That books and libraries were essential in total global war admitted of no argument.

The army library service, maintained on a reduced scale since 1919 at government expense, was rapidly expanded, and became a branch of the war department's special service division. Post, camp and hospital libraries, supervised and largely staffed by professionally trained librarians, were established. Travelling libraries, especially for overseas use, were formed. The navy's library organization in the charge of an experienced librarian was under the direction of the bureau of navigation. In addition to millions of books purchased with government funds (from 1940 to 1946 more than 14,000,000 books were distributed to army libraries in the United States), and to millions more supplied by the National Council on Books in Wartime for transport and overseas use, more than 10,000,000 volumes were distributed through the "Victory Book campaigns" to the armed forces and the merchant marine. The Victory Book campaigns of 1942 and 1943 were sponsored by the American Library association, the American Red Cross and the United Service organizations.

One of the remarkable publishing achievements of the war was the issue of the "armed services editions," or, "council books." These compact, paper-covered reprints of late fiction and nonfiction, popular classics and other books of general interest, were designed for overseas use. Forty titles were published each month. In 1945, at the peak, 130,000 sets, or more than 5,000,000 volumes were issued monthly.

As soon as war was declared by the United States, many libraries removed valuable books and records to places of comparative safety in view of possible bombing. The microfilming of important card catalogues was considered by some libraries. The National Resources Planning board issued (1942) a manual, *Protection of Cultural Resources against the Hazards of War*.

Wartime demands gave a new impetus to the use of microfilm in copying materials to be sent to all parts of the world. The use of "V-mail" letters to the armed forces familiarized the general public with the advantages and possibilities of microfilm. By 1944 the importance of microfilm for the reproduction and preservation of research material was generally recognized. Fremont Rider in *The Scholar and the Future of the Research Library*, proposed microprint for reproducing books on the backs of catalogue cards. Whether or not his argument was accepted, it was not improbable that certain classes of little-

used research material might some day be reproduced by microprint. Costs of preparation and storage would, obviously, be materially reduced.

After the outbreak of World War II, efforts to obtain European books and periodicals, particularly from Germany, were unceasing. Finally it was arranged that, until normal commercial channels were reopened, the Library of Congress, with the help and approval of the state department, would, on behalf of U.S. research libraries, purchase books published from 1939 to 1945, mainly in Germany, France and Italy, and would allocate the materials so secured with the aid of a joint committee representing the groups interested, the expenses to be shared by the participating libraries. A purchasing mission sailed for Germany in Dec. 1945, and by the middle of 1946 the distribution of books was begun.

The publication of the second edition of the *Union List of Serials in Libraries of the United States and Canada* (1943, *Supplement*, 1945), and the second "census" of *Incunabula in American Libraries*, edited by Margaret B. Stillwell, in 1940, were events of importance. Both were co-operative undertakings. Another notable accomplishment was the reprinting by photo offset process of the *Library of Congress Catalog of Printed Cards*, 1942-46, in 167 volumes. This was initiated and carried through by the Association of Research Libraries.

Benefactions.—Of the many gifts made to libraries during the decade the following merit special attention. In 1940 Dr. Albert A. Berg of New York presented a valuable collection of English and American literature to the New York public library in memory of his brother, Dr. Henry W. Berg. To the original gift was later added the fine collection of books and manuscripts purchased by Berg from the estate of W. T. H. Howe. In 1941 the Berg collection was further enriched by the library gathered by Owen D. Young, presented jointly by Young and Berg. In 1943 Lessing J. Rosenwald presented his magnificent collection of manuscripts and early printed books to the Library of Congress. The George Arents collection of books relating to tobacco was deposited in the New York public library by Arents in 1944. This remarkable collection of more than 4,000 pieces included rare Americana and Elizabethan literature containing references to tobacco.

Late in 1946 the Linda Hall library was opened in Kansas City, Mo., in the remodelled Hall residence. This special scientific and technical library was established as a memorial to his wife by Herbert F. Hall (died 1941) who left a trust fund of \$6,000,000 for this purpose. The collections (more than 62,000 volumes) of the American Academy of Arts and Sciences of Boston, Mass., established in 1780, were purchased as the nucleus of the new library.

The Carnegie corporation and the Rockefeller foundation continued generous aid to many library activities that could not otherwise have been undertaken. Of special importance were the grants made by the Rockefeller foundation to the American Library association for the purchase of U.S. books and periodicals for distribution to libraries in war areas.

Library Buildings.—From 1937 to 1941 many new library buildings were opened. Because of the almost complete stoppage of construction after 1941, except that required for war purposes, there was little building from 1942 to 1946. In anticipation of an extensive program of public works many libraries made detailed plans for new building, or additions to existing structures after the war, but

little was done in 1946 owing largely to the continuing shortage of materials.

It was instructive to note that the majority of buildings completed were for college and university libraries, most of them, however, for small colleges in every section of the United States except New England. The years from 1937 to 1939 were the most "active"; in 1938, for example, new buildings, to mention only a few, were completed or dedicated at Albion college, Albion, Mich.; Franklin and Marshall, Lancaster, Pa.; St. Bonaventure, St. Bonaventure, N.Y.; Salem, Winston-Salem, N.C.; Willamette, Salem, Ore. Among the new university library buildings opened between 1937 and 1941 were those of the University of Oregon at Eugene, the University of Virginia at Charlottesville (cost \$950,000), the University of Alabama at Tuscaloosa (cost \$600,000) and the Howard-Tilton Memorial library at Tulane university in New Orleans, La. (cost \$500,000). The dedication late in 1941 of the Joint University Library in Nashville, Tenn., marked a significant development in library co-operation. The new library, jointly owned and directed, served the George Peabody College for Teachers, Scaritt college and Vanderbilt university.

The reason for the remarkable number of college library buildings constructed during these years were: (1) old and inadequate existing buildings; (2) increased enrollments; (3) changed methods of teaching; and (4) the stimulus of grants made by the Carnegie corporation from 1929 to 1938 to many institutions for the purchase of books. The influence of this last factor in strengthening and improving small college libraries was considerable.

The larger university and research libraries in the United States had doubled in size every 20 years. Growth of collections outstripped construction of buildings. Even farsighted librarians planning buildings erected after 1900 failed to foresee the geometrical rate of increase, and there were few buildings more than ten years old that were not overcrowded. Because of the high costs of construction and administration it was not practicable to build new libraries every generation.

One solution suggested was a storage library for little-used books. Harvard, the Boston public library and other libraries in the Boston, Mass., region organized the New England Deposit library, a nonprofit corporation, and a suitable building with a reading room was constructed in 1941 at Allston, Mass., on land given by Harvard. Maintenance charges and construction costs were to be met by income from the rental of space to the participating libraries. The Iowa State college, Ames, also in 1941, constructed a steel storage building (cost about \$20,000; capacity 150,000 volumes) to house seldom-used books. The other plans made by Metcalf to relieve the overcrowding of the Widener library were significant. The Houghton library, the gift of Arthur A. Houghton, Jr., of Corning, N.Y., a graduate of Harvard and a collector of distinction, was opened early in 1942. This small but charming structure, adjoining the Widener building, was planned for the safe storage, convenient consultation, and attractive display of Harvard's rare books and manuscripts. In 1945 Harvard announced the gift of \$1,500,000 from Thomas W. Lamont of the class of 1892 for the construction of an undergraduate library to be erected not far from the Widener and Houghton libraries.

Late in 1945 ground was broken for the new Princeton university library, to be named the Harvey S. Firestone Memorial library in recognition of the gift of \$1,000,000

to the building fund from the Firestone family. The new building was expected to cost \$3,500,000 with space for 2,000,000 books. Plans were also being made for new buildings at the University of Pennsylvania, Philadelphia, and at the Massachusetts Institute of Technology, Cambridge.

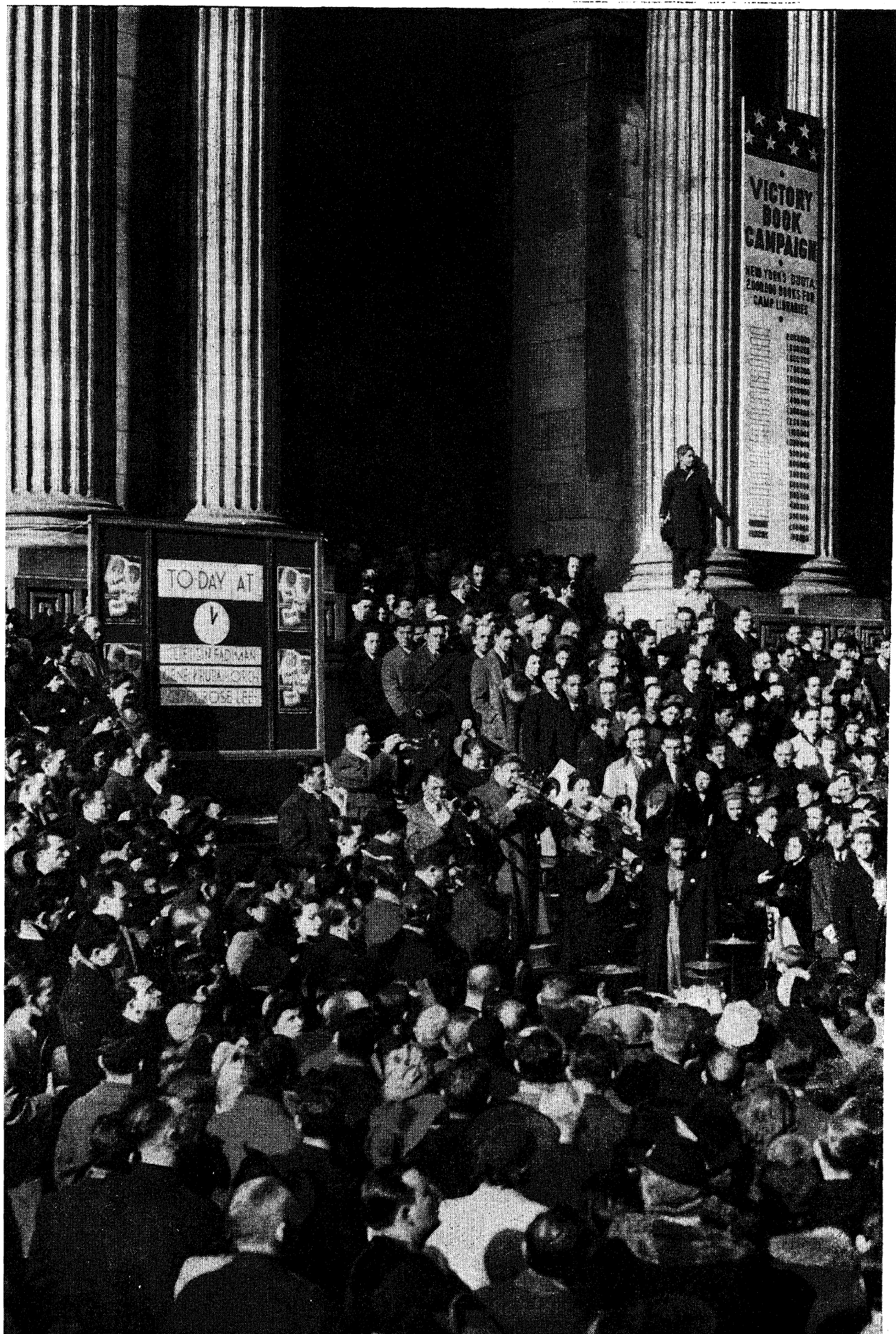
Few public library buildings were constructed between 1937 and 1941, and none from 1942 to 1946. The Rundel Memorial building of the Rochester (N.Y.) public library was opened in Oct. 1936. The cost was approximately \$3,000,000, of which \$1,000,000 came from the bequest of Morton W. Rundel. It was similar in plan to the Enoch Pratt free library, Baltimore, Md., opened in 1933. The Rochester library is mentioned here because it was really the first to adopt the simple, practical, almost revolutionary plan designed by Joseph L. Wheeler for the Enoch Pratt, a plan that had influenced much building. The fine Ingersoll Memorial building, (cost \$2,000,000), the central library for the Brooklyn, N.Y., public library, was occupied in 1939, an uncompleted wing of which had been begun more than 20 years earlier. The Fort Worth (Texas) public library (cost \$400,000; capacity 180,000 volumes) was also opened in 1939. The same year saw the completion of the main building of the Toledo (Ohio) public library (cost \$2,000,000).

In Washington D.C. the Library of Congress annex was occupied in 1939. With an estimated capacity of 10,000,000 volumes, it added 249 miles of shelving and 20 acres of floor space to the national library, overcrowded for many years. The Franklin D. Roosevelt library at Hyde Park, N.Y., was dedicated by the president on June 30, 1941. Organized primarily to house the official and private papers of President Roosevelt, it was built on land given by the president and his mother. The cost of the building was \$350,000, contributed by citizens of the entire nation. The library was under the administration of the archivist of the United States.

Size and Growth of Collections.—In 1937 there were 14 libraries containing more than 1,000,000 volumes each. Excluding the Library of Congress and the New York public library, the latter consisting of an endowed reference or research library and a tax-supported but quite separate circulation department, the remaining 12 were equally divided between university and public libraries. Of the university libraries two, Illinois and California, were state-supported; the remaining four were those of Harvard, Yale, Columbia and the University of Chicago. Cleveland possessed the largest public library, followed by Chicago, Ill., Boston, Mass., Los Angeles, Calif., Cincinnati, Ohio, and Brooklyn, N.Y.

In 1946 there were 22 libraries that possessed 1,000,000 or more volumes each. Accurate and comparable figures for 1946 were not available, and in the absence of the tables usually prepared by the American Library association but discontinued in 1945, the statistics were taken from the *American Library Directory*, 1945. Excluding again the Library of Congress, the New York public library, and also the Army Medical library in Washington D.C., credited with possessing more than 1,000,000 volumes, the remaining 19 included 11 university and 8 public libraries. The five university libraries that had passed the 1,000,000 mark since 1937 were the state universities of Minnesota and Michigan, Cornell, Princeton and the University of Pennsylvania. The Detroit public library and

New York public library steps where daily rallies between Jan. 19 to 31, 1942, yielded about 600,000 books for donation to the U.S. armed services



the Carnegie library of Pittsburgh, Pa., were the only two public libraries that had "graduated" into the "million-volume" group within the decade. Two other libraries (the New York state library at Albany and the St. Louis, Mo., public library) might be classed as runners-up, since their holdings were rapidly approaching the million-volume figure. Of these 22 libraries, 8 possessed more than 1,000,000 but less than 1,250,000 volumes, 3 from 1,250,000 to 1,500,000, 5 more than 1,500,000 but less than 2,000,000 volumes. The public libraries of Chicago and Cleveland possessed more than 2,000,000 books but less than 2,500,000. Yale counted 3,365,400 volumes. Harvard (all libraries), and the New York public library (both reference and circulation departments) each possessed more than 4,500,000 volumes. The Library of Congress, as the national library, properly topped the list with a recorded total of 7,281,681 volumes.

These 22 libraries contained roughly some 46,000,000 volumes. Because of duplication of many books it would be difficult to hazard a guess as to the number of separate titles represented. In any case the total was impressive evidence of the growing resources for study and research in large U.S. libraries. In general the university and reference libraries increased at a more rapid rate than the public libraries, not only in the number of volumes, but also in the number of different titles acquired. Public libraries continued to buy many copies of new and standard books, and to discard many volumes that had become worn out, out-of-date and no longer useful. The net increase each year was likely to be smaller than in university libraries.

Librarians.—No decade within memory witnessed more changes in the librarianships of the major U.S. libraries. Herbert Putnam, librarian of congress since March 13, 1899, retired Aug. 1, 1939, becoming librarian emeritus. During the 40 years of his librarianship he had made the Library of Congress in all but name the national library. On June 6, 1939, President Roosevelt nominated Archibald MacLeish to be librarian of congress. MacLeish, trained in the law, was best known as a poet and the winner of the 1932 Pulitzer prize for poetry. He resigned upon his appointment as assistant secretary of state in charge of public and cultural relations, and was succeeded by Luther H. Evans, who had been chief assistant librarian since Nov. 1, 1940.

Harry Miller Lydenberg retired from the directorship of the New York public library Oct. 1, 1941, and was succeeded by Franklin F. Hopper, chief of the circulation department of the library since 1919. Lydenberg had been a member of the staff of the library since 1896, and director since 1935. *Bookmen's Holiday* (1943), a volume of essays and studies in his honour, was the tribute of some of his friends to his distinguished service to scholarship and to librarianship. Hopper retired Oct. 1, 1946, and was succeeded by Ralph A. Beals, director of the University of Chicago libraries since 1942, and dean of the university's graduate library school since 1945.

Keyes D. Metcalf, chief of the reference department of the New York public library since 1928, was appointed director of the Harvard university library Sept. 1, 1937. He was president of the American Library association in 1942-43. Andrew C. Keogh retired from the librarianship of Yale university in 1938 after 40 years of service, and was succeeded by Bernhard Knollenberg on April 9. Knollenberg resigned in Jan. 1945, and James T. Babb, assistant librarian from 1938, and later acting librarian, was appointed in his place.

Charles C. Williamson, director of libraries and dean of the school of library service of Columbia university, retired June 30, 1943. His great work at Columbia was the organization in 1926 of the school of library service, formed by the merger of the New York state library school at Albany and the library school of the New York public library, the co-ordination of the Columbia libraries, and the planning of the new library building, now named the Nicholas Murray Butler library, the gift of Edward S. Harkness, which was opened in 1934. Williamson was succeeded by Carl M. White, director of the library and the library school of the University of Illinois. At Princeton in 1939 Julian P. Boyd, formerly librarian of the Pennsylvania Historical society, was named in succession to James T. Gerould, retired. M. Llewellyn Raney, director of the University of Chicago libraries since 1927, retired Oct. 1, 1942, and Ralph A. Beals was appointed to the directorship. Four years later (1946) Beals resigned to become director of the New York public library.

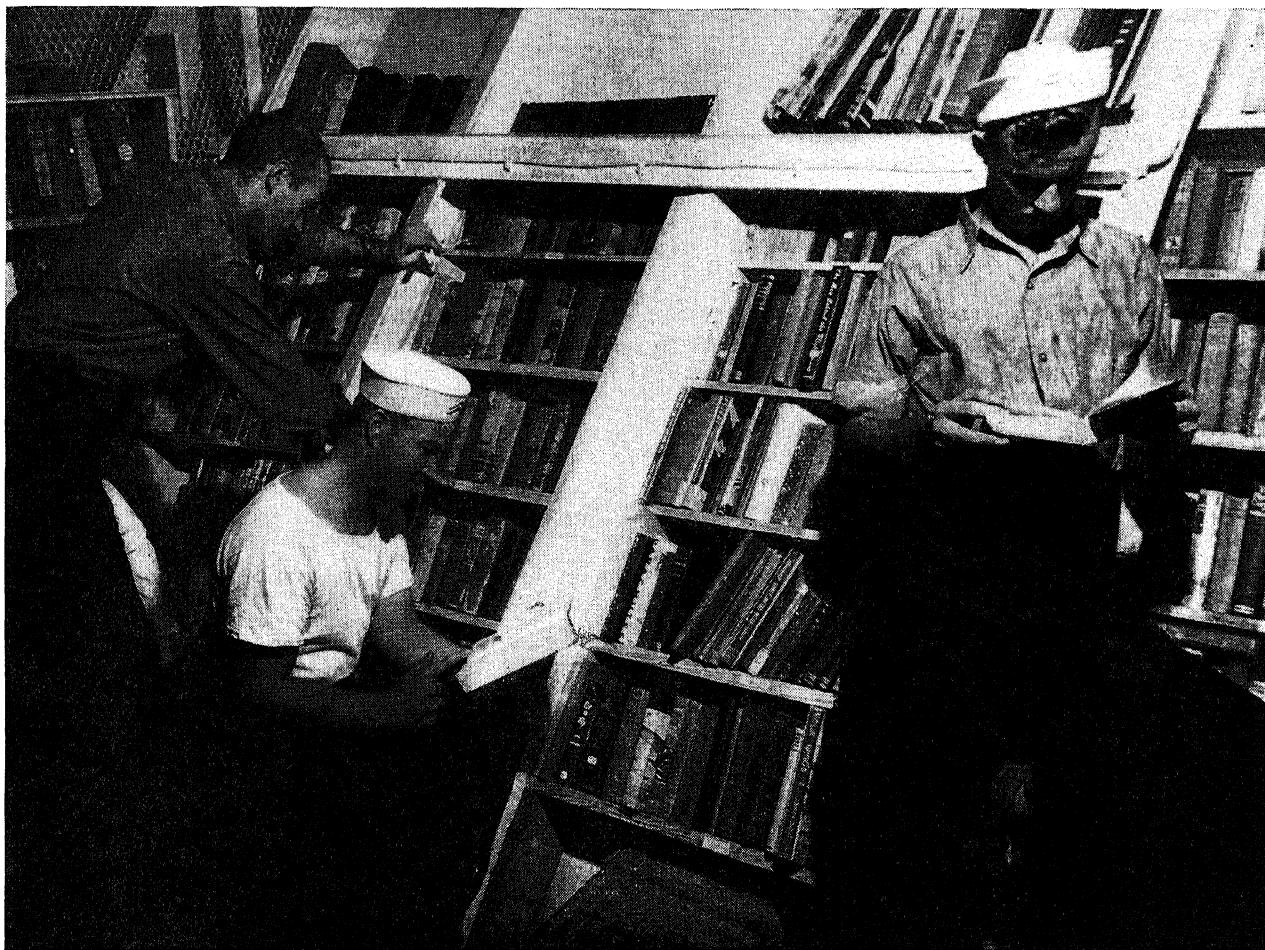
On July 20, 1941, William Warner Bishop, librarian of the University of Michigan, retired from the position that he had filled with great distinction since 1915. Dr. Warner G. Rice, professor of English in the university, was appointed director. Bishop was president of the International Federation of Library Associations from 1931 to 1936. The publication of *William Warner Bishop: a Tribute, 1941*, a volume of essays in his honour, attested the affection and respect of friends at home and abroad.

Frank K. Walter, librarian of the University of Minnesota since 1921, retired June 30, 1943, and was succeeded by E. W. McDiarmid, associate professor in the University of Illinois library school. Walter died Oct. 28, 1945. Carl M. White succeeded Phineas L. Windsor, who retired Sept. 1, 1940, after 30 years as librarian of the University of Illinois and director of its library school. Upon White's resignation in 1943, Robert B. Downs, director of libraries of New York university, was appointed librarian. Dr. Otto Kinkeldey, distinguished musicologist and librarian, retired from Cornell university in 1946, and was succeeded by Dr. Stephen A. McCarthy from the Columbia university library.

Donald Coney, librarian of the University of Texas, was appointed to the librarianship of the University of California (Berkeley) on Aug. 1, 1935, in succession to Harold L. Leupp, retired. In 1941, Dr. Charles W. David was appointed director of libraries of the University of Pennsylvania, a position created to co-ordinate the work of the general library of the university, the departmental libraries and the Philadelphia Bibliographical centre.

James I. Wyer, director of the New York state library (Albany) for 30 years, retired in 1938. Robert W. G. Vail, librarian of the American Antiquarian society at Worcester, Mass., since 1930, was appointed to the directorship Jan. 15, 1940. Vail resigned in 1944 upon his appointment (Sept. 1) as director of the New York Historical society (New York city). Dr. Charles F. Gosnell became director of the state library Sept. 1, 1945.

Linda A. Eastman, after 45 years of service in the Cleveland public library, retired from the librarianship in 1938, and was succeeded by Charles E. Rush, who resigned early in 1941. Clarence S. Metcalf, business manager of the library since 1924, was made librarian Nov. 28, 1941. Chalmers Hadley, librarian of the Cincinnati, O., public library since 1924, became librarian emeritus late in 1945, and was succeeded by Carl Vitz, librarian of the Minneapolis, Minn., public library and president of the American Library association in 1944-45. On July 1, 1941, Adam Strohn, librarian of the Detroit, Mich., public library since



Seaman's library aboard a floating repair shop servicing B-29s based in the Marianas during 1945. The shelves were slanted to conform to the shape of the ship's hull

1913, retired. His successor was Ralph A. Ulveling, the associate librarian, who served as president of the American Library association in 1945-46. Arthur E. Bostwick, for 28 years the distinguished librarian of the St. Louis, Mo., public library, resigned March 1, 1938, to become associate librarian. Charles H. Compton, assistant librarian since 1921, was appointed librarian. Bostwick died Feb. 13, 1942. Matthew Dudgeon retired from the librarianship of the Milwaukee, Wis., public library March 1, 1941, after more than 20 years of service. Wyllis E. Wright, appointed librarian of the reorganized Army Medical library, Washington, D.C., July 1, 1945, resigned late in 1946 to become librarian of Williams college, Williamstown, Mass.

Louis R. Wilson retired from the deanship of the University of Chicago graduate library school in Sept. 1942. Joseph L. Wheeler, librarian of the Enoch Pratt free library, Baltimore, Md., since 1926, retired March 31, 1945. The design of the Enoch Pratt library had marked influence on the planning of later public library buildings. Dr. Harrison W. Craver, for many years director of the Engineering Societies library, New York city, retired in 1946. He organized the technology department of the Carnegie library of Pittsburgh in 1900, and was a pioneer in this specialized field of librarianship. He was president of the American Library association in 1937-38.

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Great Britain.—During the period 1937 to 1940 there was much activity in library building, largely because of the great expansion of library services of all kinds. More than 220 new or extended central and branch public libraries were opened, the largest being the new central libraries at Bolton, Huddersfield, St. Marylebone and Southampton. In addition to these, the National library of Wales was opened by the king and the new library of the University college, Swansea, by the duke of Kent, in 1937. The same year saw the opening of the Arts Library building of the Victoria university of Manchester, the opening, after reconstruction, of the North library of the British museum, and the laying of the foundation stone of the Roborough library of the University College of the South-West, Exeter, which was eventually opened in 1940. The Harold Cohen library at the University of Liverpool was opened by Lord Baldwin in 1938, and during this year the library of the University of London was transferred from South Kensington to the great new building near the British museum.

After World War II, during which all library building was suspended, the New Bodleian library upon which work had begun in 1930, was formally opened by the king in Oct. 1946.

The establishment of a regional system for the south-west of England was the culminating move in the formation of a great national system of library co-operation, with a common centre in the national central library. England and Wales were then covered by a series of eight regional systems and the London borough libraries inter-lending system. In 1938 a bureau of American bibliography, equipped with a complete set of the Library of Congress cards, was established at the national central library.

Progress was made by public libraries, despite the difficulties and shortages of six years of war. The demand by borrowers was such that total issues of about 230,000,000 from all public libraries in Great Britain in 1938 had risen to more than 300,000,000 in 1946. During World War II the people of Great Britain read more than ever before, but the resources of the libraries were severely taxed. A large proportion of trained personnel was called for national service, the output of new books was much less than in normal times and, more disastrously, many libraries were destroyed or badly damaged by German bombing: 156 libraries sustained complete loss or severe damage and another 280 were less badly damaged. Altogether nearly 1,000,000 books were destroyed in these incidents.

Among those which suffered complete loss of buildings or very serious damage were University college, London, Birkbeck college, the national central library, the London library, the public libraries of Clydebank, Coventry, Exeter, Hampstead, Liverpool, Lowestoft, Plymouth and certain sections of the British museum.

The need for the reconstruction of these libraries and those destroyed on the continent was early recognized and in 1942 the National Book Recovery campaign was launched, which, together with direct donations, was eventually responsible for the recovery for libraries of approximately 1,000,000 books. An Inter-Allied Book centre for the sorting, allocation and dispatch of the recovered books was opened in 1944 and closed at the end of 1946, its great and arduous task completed.

In the first years of World War II, properly organized libraries were not established for the forces but millions of books and periodicals were provided through the services libraries for the men and women of the navy, army and air force. Later many command and unit libraries were set up in Great Britain and the theatres of war. Furthermore, most public libraries provided library service for military camps and isolated units stationed within their area.

(See also SOCIETIES AND ASSOCIATIONS.)

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Libya

See ITALIAN COLONIAL EMPIRE; WORLD WAR II.

Lidice

See FRANK, KARL HERMANN.

Lie, Trygve

Lie (1896–), Norwegian statesman, was born July 16, 1896, in Oslo, the son of a carpenter. A member of the Norwegian Labour party, he studied at the Oslo University Law school and upon graduation in 1919 became secretary general of the party. In 1926, he was appointed to membership in the party's national council as legal adviser; his function was to mediate labour-management controversies. In 1935, he was named justice minister in the cabinet of Premier Nygaardsvold; four years later, he was shifted to the post of minister of commerce.

In the late spring of 1940, after it was apparent that the Germans were going to succeed in crushing Norwegian resistance, Lie fled to England; there he became minister of shipping and supply in the Norwegian government-in-exile and later foreign minister. Politically, Lie refrained from joining either of the great Allied power blocs in the process of formation while World War II was still underway, but he managed to maintain the respect of both the Anglo-U.S. and soviet groups. He headed the Norwegian delegation to the U.N. conference at San Francisco (April-June 1945) and to the U.N. conference in London that opened in Jan. 1946.

Nominated for secretary general of the U.N. security council, he was elected Feb. 1, by a 46 to 3 vote in the assembly. Lie stirred up controversy regarding procedure within the security council itself when on April 16, 1946, he said he questioned the legality of the council's decision to retain the Iranian case on its agenda after both parties to the dispute (the U.S.S.R. and Iran) had asked for its dismissal. A dispute arose as to whether Lie had the authority to intervene in the council's discussions. Subsequently his right to address the council was upheld and the security council empowered him to intervene in any debate before the organization.

An independent, sovereign principality northeast of Switzerland, Liechtenstein lies on the upper Rhine between the former Austrian province of Vorarlberg and the Swiss cantons of St. Gallen and Graubünden. Area, 65 sq.mi.; pop. (census of Dec. 1941) 11,102. Chief town, Vaduz (capital, pop. 2,020). Franz Joseph II (b. 1906) was given ruling authority by his 84-year-old great-uncle Franz I (ruled 1929-38) on March 30, 1938, and after the latter's death was crowned prince on May 29, 1939. The monarchy is hereditary in the male line. The constitution adopted in Oct. 1929 provided for a diet of 15 members elected for 4 years by direct vote on the basis of universal suffrage and proportional representation. Language, German; religion, mainly Roman Catholic; products, corn, wine, fruit, wood and marble; industries, cotton textiles, leather goods and pottery; cattle raising, favoured by the fine Alpine pastures, is highly developed. Postal, telephone and telegraph systems are administered by Switzerland. There is no army, and the taxes are very slight; about a third of the revenue is contributed by the prince; another third comes from the sale of postage stamps to stamp collectors; and there is a considerable revenue from large international corporations which set up their headquarters in the country, pay nominal fees for the privilege and escape the taxes in their own country. A private patriotic association circulated a petition in 1939 to ascertain the wishes of the country as to joining Germany or continuing the economic ties with Switzerland; 95% of the registered voters rejected union with Germany and demanded continued independence. Thanks partly to Swiss protection, Liechtenstein remained neutral during World War II. (S. B. F.)

Liechtenstein: Statistical Data

Item	1938		1944	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Exchange rate		1 Swiss franc = 22.87 cents		1 Swiss franc = 23.35 cents
United States . . .		20.40 Swiss francs = £1		17.35 Swiss francs = £1
Great Britain . . .				
Finance				
Government revenue	\$562 (£115)		\$434 (£108)	
Government expenditures . . .	\$558 (£114)		\$363 (£90)	
National debt	\$1,079 (£221)		\$728 (£180)	
Transportation				
Highways . . . . .		...		88 mi.
Communication				
Telephones . . . . .		...		728
Radio sets . . . . .		...		1,720
Crops				
Potatoes . . . . .		...		11,000
Corn . . . . .		...		1,650
Livestock				
Cattle		6,872		2,436
Swine		3,715		2,803
Sheep and goats . . . . .		...		1,536
Imports and Exports.*				

*All data concerning trade of Liechtenstein are included with those for Switzerland.

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Life Expectancy

See DEATH STATISTICS; INFANT MORTALITY; SUICIDE STATISTICS.

Life Insurance

See INSURANCE.

Lighthouse Service

See COAST GUARD, U.S.

Lighting

See ELECTRICAL INDUSTRIES; INTERIOR DECORATION.

Lilienthal, David Eli

Lilienthal (1899-), U.S. lawyer and public official, was born July 8, 1899, at Morton, Ill. From 1923 to 1926 he was associated in law with Donald R. Richberg, former administrator of the National Recovery act. Later he was engaged in telephone rates litigation for the city of Chicago. In 1931, as a member of the Wisconsin Public Service commission, he was a spearhead in Gov. Philip La Follette's fight against state power companies. Appointed a director of the Tennessee Valley authority in 1933, Lilienthal was a storm centre of the quarrel in the directorate during 1938. Lilienthal and Harcourt A. Morgan in that year became involved in a bitter dispute with the third director, Arthur E. Morgan. The latter eventually was dismissed by President Roosevelt, who appointed Harcourt Morgan to the chairmanship. Lilienthal later was made chairman (Sept. 1941) and was reappointed to this position in May 1945. He resigned on Oct. 28, 1946, after his nomination to the chairmanship of the U.S. Atomic Energy commission.

Lima Conference, 1938

See PAN-AMERICAN CONFERENCES, 1937-46.

Lime

Demand for lime during World War II brought a 60% increase in production in the United States. Work first for the defense program and later for the war program culminated in a peak demand of 6,596,615 short tons in 1941 as compared with 4,124,165 tons in 1937 and 3,346,954 tons in 1938. Expansion was most marked in chemical and refractory lime, with a smaller increase in building lime, and a decrease in agricultural lime. By 1942 the bulk of the war construction work was finished and the consumption in building was cut almost in half, diverting more lime to industrial uses, which continued to expand up to 1943 and 1944, declining in 1945.

Salient Statistics of the U.S. Lime Industry

	(Thousands of short tons)				
	1937	1939	1941	1943	1945
Production	4,124.2	4,254.3	6,079.4	6,596.6	5,920.6
Quicklime	2,822.9	2,936.3	4,489.2	5,283.2	4,565.6
Hydrated lime	1,301.3	1,318.0	1,590.2	1,313.4	1,355.0
Uses:					
Agricultural	406.5	362.3	382.7	454.1	373.4
Building	948.6	1,000.5	1,065.6	558.0	549.5
Chemical	2,151.4	2,219.9	3,561.2	4,307.8	3,810.3
Refractory	617.7	671.6	1,069.9	1,276.7	1,187.3

Demand for building lime was still low in 1945-46 as the postwar building program had not yet made much progress. Lime for agricultural use averaged below the prewar level as increased demand for liming material was concentrated on limestone rather than lime.

(G. A. Ro.)

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Limes

See FRUIT.

Limestone

See STONE.

Lindbergh, Charles A.

Lindbergh (1902-), U.S. aviator, was born Feb. 4, 1902, in Detroit, Mich. He returned to the United States from England in 1939 to resume his work for the U.S. air

corps. Meanwhile he publicly advocated strict U.S. neutrality in World War II. In April 1941 he joined the America First committee, an organization advocating U.S. non-intervention in European affairs. Later that month he resigned his commission in the air corps after he had been rebuked by President Roosevelt for his political activities. As part of the anti-war campaign sponsored by the America First committee, Lindbergh charged that the British, the Jews and the Roosevelt administration were trying to involve the country in the war. After the Pearl Harbor incident Lindbergh urged vigorous retaliation against the Japanese. Following U.S. entrance into the war, he engaged in research for the war department in a civilian capacity and worked for aircraft and bomber plants.

Linen and Flax

The world's largest producing areas of flax fibre during the decade 1937-46 were the countries of eastern Europe, particularly the U.S.S.R. It was from this area that the linen-manufacturing countries secured their major supplies; and consequently, the cutting off of these countries from 1939 to 1945 was a severe blow, although large-scale programs of flax cultivation in previously low or non-producing areas like Northern Ireland, Australia, Egypt, South Africa, Canada and the United States partially offset the loss. Experiences during World War I had prompted Great Britain, especially, to lay plans for cultivation of flax in the event of national need, for flax was an essential in war for many products, including strong webbing, tapes, threads, cords and duck.

Approximately 5,000,000 ac. of flax were planted each year in the 1937-46 period with a production of nearly 2,000,000,000 lb. of fibre. Flax-fibre acreages throughout the world during the periods 1935-39 (prewar) and 1940-44 (during the war period) are given in the table.

Flax-fibre Acreages of the World
(in thousands of acres)

	1935-39	1940-44
World Estimate	6,397	5,260
Eastern Europe	5,747	4,037
U.S.S.R.	4,973	3,264
Poland	340	366
Lithuania	204	173
Latvia	164	170
Estonia	66	64
Northwestern Europe	209	198
France	92	89
Belgium	75	47
Netherlands	42	43
Denmark . . . . .	..	14
Sweden . . . . .	..	5
British empire	44	263
United Kingdom:		
Northern Ireland	23	85
Great Britain	6	43
Eire	4	20
Canada	8	37
Australia	1	50
New Zealand . . . . .	..	11
British East Africa (Kenya) . . . . .	..	13
India . . . . .	..	1
Other British countries	2	3
Central and southern Europe and Egypt	169	290
Germany	18	105
Czechoslovakia	22	40
Rumania	55	54
Hungary	31	28
Yugoslavia	29	33
Bulgaria	1	8
Italy	10	15
Egypt	3	7

In addition to the countries listed, flax was cultivated during the war in Latin America and in the United States. In Latin America, Peru was the largest producer; commercial production started there in 1939. In 1942 production reached 7,900,000 lb. compared with 3,600,000 lb. for the next largest producer, Argentina. By 1945 Peru was

producing only 2,900,000 lb. and despite large-scale efforts by the government through the ministry of agriculture to encourage production by government allowances, government grading, etc., it was not expected that production would again reach the wartime levels. During the war, however, Peruvian flax was an aid to the U.S., which bought the entire crop under a series of contracts begun in 1941. In the U.S., flax was produced primarily in Oregon and Minnesota; while quantities were relatively small, it was reported in 1946 that the U.S. industry had achieved a firm commercial status and would continue to produce for the peacetime market.

Wartime Effects on Linen Fabrics.—While Irish linen remained the common standard of reference in thinking of the flax and linen industry, Northern Ireland shared top-production honours with Belgium and Czechoslovakia before the outbreak of World War II, with Poland and Russia following. In March 1939 Czechoslovakia's production was diverted entirely to Germany. In Sept. 1939, Poland was removed from the market, and Polish flax shipped to Northern Ireland for manufacture into linen fabrics disappeared. The invasion of Belgium in 1940 cut off a major source of linen materials and also of the best grade of flax.

Northern Ireland's factories assumed the burden of producing linen fabrics for the western world, but governmental controls on civilian fabrics were reported as eliminating almost all of them. The factories even resorted to manufacture of rayon fabrics to supplement their short supply of flax for civilian purposes. Among the linen fabrics used by the British government was a "blitz" cloth, used to cover damaged buildings. It was a light-weight duck coated with cement or used as woven. In all, the government appropriated half of the industry's production.

United States linen fabrics were first introduced in March 1944, when samples of a dress linen, woven entirely from U.S.-grown flax on cotton looms, were shown in a 36-in. width in vat-dyed colours. By 1946 screen-printed U.S. linen fabrics were being shown throughout the country by large department stores. The flax fibre came from Oregon and Minnesota, and the yarn was woven in Rhode Island on machinery especially imported from Belfast, Northern Ireland or built in the U.S. Accelerated methods of retting the flax and other improvements in mechanized handling of the yarns encouraged U.S. mills to believe that U.S. linen would be able to compete with the European products when they were restored to normal conditions.

In the meantime, the Irish linen industry was making extensive plans to retain its leadership in manufacture. Plans for an international promotion campaign were launched in March 1945 in Belfast, following several preliminary discussions as to the best ways of restoring the industry in the postwar period. The Irish Linen guild proposed an annual fund of £150,000 (\$600,000) in which Irish producers, their U.S. customers and flax growers would participate. The general plan was similar to one followed in 1926, although hope was expressed that the results would not be similar; producers in Belgium and Czechoslovakia reaped the benefit of the increased demand since they were able to sell at much lower prices because of their lower costs.

Labour difficulties were a continued problem to the linen mills. The relatively low wages paid and the unpleasant working conditions brought about a shortage of operatives. It was pointed out that three to seven years were required for training a spinning operative, and spinners were inclined to prefer working on rayon staple yarns because of

their greater cleanliness. The spinning of flax yarns required working barefoot in a humid room. The same fears were raised as to continuation of the U.S. linen industry since wages were still higher and operatives more difficult to please. In the U.S. it was hoped that the increased mechanization of the processing would offset the wage disadvantages.

Reports indicated that the Soviet Union, largest flax producer in the world, might emerge as a manufacturer of linens as well as an exporter of flax to linen-producing countries. There were definite indications, however, that Russian flax would continue to be shipped to linen-weaving countries, and one report stated that some flax and tow were being shipped to the U.S. Shipments of Russian flax were received in Great Britain in 1945, and it was said to be up to prewar quality.

The future of linen fabrics, both for household and garment use, was obscure. Use of rayon staple which could be made to simulate the appearance of the linen weave without its high cost but achieving new effects in colour and appearance, had made inroads on the household linen business during 1936-40; and it was expected that this trend would continue. This was especially noticeable in Northern Ireland. Disadvantages of linen garment fabrics, such as tendency to crease and limitation of colours available, were offset by new finishes such as the Tebilized crease-resistant finish, originated in Great Britain, and the use of new dyestuffs which gave satisfactory results in high fashion colours. Prevalence in the U.S. of sportswear types of fabrics was considered an added opportunity for linens.

After World War II had ended, a mission of U.S. textile men visited Germany and learned of several new methods of utilizing unretted flax. The fibre took the place of cotton and augmented the limited supply of rayon staple. After being harvested by mowing machines, the flax plant was deseeded and prepared for spinning entirely by large machines. It was blended with rayon staple and called Flockenbast. The final cost was greater than for 100% rayon or cotton fabrics. The high wet strength of the flax offset the low wet strength of the rayon, and the fabric had desirable characteristics of linen, including good absorption and quick drying properties. Two methods of treating the flax straw were used; one with alkali or caustic soda and the other the Korte process, using an alkaline treatment combined with chlorination. The more expensive chlorinating process gave a better separation of the fibres, a cleaner yarn and a softer and finer yarn, suitable for fine handkerchiefs and shirt fabrics. The fabric dyed and printed satisfactorily.

Subsidizing of Flax Production.—A world-wide subsidy program for flax production marked the years immediately before and during World War II. Need for flax by the Allies outweighed any consideration of cost, but there was also a reluctance to sow the flaxseed because of its tendency to take a great deal of the richness from the soil and because of the amount of hand manipulation required. Remembering unfortunate experiences during World War I, when war on the European continent cut off flax supplies, Great Britain, particularly, had granted subsidies in 1920-21 amounting to \$104,000 a year and again in 1921-22 for \$27,000. In April 1938 the Flax Development committee was set up by the government of Northern Ireland. Spinners, farmers, industrial research workers, mill owners and accountants in the flax-fibre and linen industry were among the ten members. The government gave \$668,000 during the first 3 years of the committee's existence with the provision that 10% of that amount would be provided by agricultural and linen trade groups interested

in the work. To provide a more secure basis of future operation than perpetual subsidy, the committee devoted its funds to research in more successful cultivation.

By early 1942 four 4-tank retteries had been constructed, and more direct means of securing the flax straw were devised. The mill owner bought the straw from the flax farmer, sometimes even collecting it from the farm. Prices were guaranteed. Just prior to 1939 flax sold at from 13 cents to 19 cents per pound. In 1939 prices were fixed by the British ministry of supply in association with the ministry of agriculture in Ireland at 14.4-23.8 cents per pound. In 1940 the range was increased to 25.2-32.4 cents per pound. By 1942 the range was 38.2-45.4 cents per pound. In 1943 and 1944, however, the price dropped to 36-43.2 cents per pound but an additional payment of \$40.35 was made to the grower for each acre harvested to the satisfaction of the ministry. Scutching mills were also given a subsidy to cover the entire cost of renovating or building the mills—one half as a grant and the other half as a loan. For 1945 the acreage bounty was lowered from \$40.35 to \$20.16 and in 1946 was discontinued entirely.

Schools for scutchers were established as early as 1940 by the ministry of agriculture. A subsidy of \$40.35 was allowed for each trainee, \$8.07 of which went to the mill owner and the balance proportioned between the instructor and the trainee. Group fire insurance, government-financed seed, manure, retting tanks, scutching mills and pulling machines were provided. This program was also followed in Scotland and England, where flax cultivation had reached a low figure of a few hundred acres in 1931, and only an experimental plot of 3 ac. at Sandringham was reported in England.

In 1939 the British government set a goal of 18,000 ac. for Scotland and England. By 1940 all production was under control of the Scottish Flax Company, Ltd., at Blairgowrie, or with the British government at the University of Reading. In 1941-42, the Flax Production scheme was adopted. Results of prewar experiments at Sandringham and the Norfolk Research station were used as a basis for setting up processing factories. The processors acted as agents of the ministry and contracted with farmers to grow the straw. Output of processed fibre became the property of the ministry. Prices were fixed and kept as near as possible to actual costs. Mechanization was financed by the government. Minimum wage rates were made effective Jan. 16, 1942, in order to encourage workers to remain in the industry.

The trend in 1945, however, was to do away with these special subsidies. In addition to the elimination of the acreage bounty in Ireland, previously mentioned, no further help was given to the Scottish industry. In England, however, the Flax Production scheme was continued, and the government guaranteed a market for an annual minimum acreage through the 1948 harvest. For the 1945-46 season, the acreage was 25,000.

In Eire, the Flax Act of 1936 guaranteed a bounty of \$49.71 an acre. No bounty was paid after 1940, because of high prices, which ranged from 18 to 25.2 cents per pound for the 1941 crop. In 1942 prices were raised and guaranteed in a range of 30.9 cents to 38 cents per pound for dam-retted flax. Prices were raised again the following year, from 35.9 cents to 43.1 cents per pound. Additional bounties were given for erection of a dam and a contribution to the new Flax Development board. In 1945 prices were 36-43.2 cents per pound. The Flax Development board was established in 1943 by the department of agri-

culture to train new workers, make grants toward the cost of erecting new scutching mills, provide turbine scutching units and construct or renovate flax dams. The 1946 contracts guaranteed 28.8–36 cents per pound for the dam-retted and hand-scutched flax and 31–38.2 cents per pound for the turbine-scutched.

Canadian flax acreage in 1937 was about 5,000 ac. Between 1936 and 1939 the government encouraged the adoption of modern milling and labour-saving machinery to reduce the cost of production and thus encourage greater acreage, particularly in Quebec, where production was concentrated. When World War II began, the Special Products board increased acreage rapidly so that by 1942 the total was 47,000. The following two years showed a decline, so that 1945 saw only 21,000 ac. in flax. Prices were set each year; a fibre flax administrator controlled an export program whereby, in Sept. 1941, 50% of the crop was ordered shipped to the United Kingdom. The remaining 50% was to be divided between the U.S. and Canada. In Aug. 1942 all flax of spinnable quality was sold to the Special Products board which then resold it, except for essential Canadian requirements, at the same price to both the British and U.S. governments on a 50–50 basis of quality. Prices in the 1942–43 crop year ranged from 33.6 cents to 40.9 cents per pound for scutched flax. During the following year, the price of top grade flax was increased to 55 cents per pound and continued at that rate through 1946. Canadian prices were less than U.S. prices but it was explained that Canadian flax was dew retted, whereas United States flax was water retted. Further aid was given through interest-free loans for the construction of scutching plants and essential machinery. In the latter case, a rebate of one-third of the price was also given if machinery was purchased between Jan. 1, 1940, and March 31, 1945. No further export contracts were made with the British following the close of the 1945–46 flax crop, and guaranteed sales and prices also terminated.

Bounty payments had been a custom in Australia from March 1, 1930, to Feb. 28, 1935, but nothing was done to encourage flax production between 1935 and 1940. The United Kingdom's importunities for increased production in wartime resulted in a guaranteed price to growers. Flax mills were constructed for processing the straw and were owned and controlled by the commonwealth government.

In Australia, mechanization of flax pulling reduced the cost of production appreciably. During the period 1940–43, inclusive, however, the maximum prices, including bonus, rose from \$19.37 a long ton (2,240 lb.) to \$32.28. The estimated average cost per acre of growing and delivering the crop to the mill was \$17.43. Total acreage planted rose from about 2,000 ac. in the 1939–40 season to about 57,000 ac. from 1942 to 1946.

New Zealand's first flax crop was planted in 1939 under a wartime agreement with the British government. Cost of production was guaranteed, and a minimum fibre price up to \$110.30 per ton of 2,240 lb. and \$15.32 per acre. Losses were met by the government as a war expense.

A grant was given British East Africa following a study made in 1938 as to flax-growing possibilities. There had been a substantial cultivation during World War I, but with dropping prices production fell to almost nothing. Wheat had taken the place of flax, and the Kenya Flax board, operating 12 processing plants in 1943, paid flax prices comparable to wheat prices. Acreage, which had been practically nil between 1920 and 1939, rose to 16,000 in 1943 but once wartime government purchases ceased,

acreage returned to wheat; no help was given after 1945.

Belgian interest in flax cultivation was so extensive before World War II that no incentives apparently had to be offered; but in the Netherlands, prior to 1940, those who grew flax on land allotted to them by the Provincial Agricultural Emergency organization were given a bounty of \$13.63 an acre under a law passed in 1934. Processors were paid \$34.09 an acre. Following World War II government authorities opened the Institute for Research in Netherlands Flax Cultivation for the purpose of continuing the program interrupted by German occupation.

In France a law passed in 1931 permitted bounty payments on stripped flax in the straw, of French origin, and retted on French territory. Total payments allotted were up to \$2,352,000 a year. A premium of 3.7 cents per pound was allowed during 1937–38 on the basis of the price of Russian flax on the exchange, unless the exchange price exceeded 12.9 cents per pound. These premiums continued throughout the war.

Because of eastern Europe's substantial lead over all other sections of the world in production of flax, the Russian program of encouraging the industry was on a much wider scale. Prior to 1941 a contract system for flax production between the government and the collective farms set prices, delivery quotas and acreage. Tax benefits were given for producing the quota, but failure to meet the quota meant only loss of income. Incentive payments were offered for exceeding quotas; the amount varied with the district. Where the quota was high, the supplementary price was a higher percentage of the regular price. For example, 50% of the contract price was given on a quota of 89–134 lb. per acre; 200% if the quota was 368 lb. an acre. In 1941 a procurement plan was adopted. Payments were made to the collective farm in rubles, and the price depended upon type and quality over a range of 32 grades of flax. In addition to cash payments, the farm received special allotments of fats and oils for each quintal (220.46 lb.) of flax. In 1945 a new decree provided bonuses to farm members as individuals, paid by the collective farm. Each member was paid outright extra grain and 1 ruble in cash for each 10 kg. (21.4 cents for each 2.5 lb.) of flax sorted, dried and delivered to the factory. An additional 2.2 lb. of grain and 18.9 cents in cash were paid for each 100 kg. (220.5 lb.) of flax delivered. Flax workers of each farm were given 40% of the farm's incentive payments for excess quantities delivered as their special share of the income. Wartime losses and destruction took 50% of prewar productive capacity, but an official five-year plan called for a crop of about 1,764,000,000 lb. of fibre in 1950.

Egypt, where flax and linen had been found in the ancient tombs, was another country that preferred wheat instead of flax as a crop. With the opening of World War II, however, the Egyptian ministry of agriculture arranged with the British government to purchase the entire 1940–41 crop at a price comparable with that of wheat and barley. This arrangement continued until the close of 1944, when wheat prices were raised without a comparable change in flax. Production declined from 30,000 ac. to 7,000 ac. the following year.

Subsequently, acreage was about equal to normal small prewar plantings.

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Linguistics

See ANTHROPOLOGY; LANGUAGES.

Linlithgow, Victor Alexander John Hope

The 2nd Marquess of Linlithgow (1887–), was educated at Eton and succeeded to the marquise in 1908. After serving in the British army, he was civil lord of the admiralty from 1922 to 1924 and chairman of the Royal commission on Indian agriculture from 1926 to 1928. In 1933 he was appointed chairman of the joint select committee on Indian constitutional reform; he helped formulate and enact the Government of India bill in 1935. Linlithgow succeeded Lord Willingdon as viceroy of India in April 1936. With the outbreak of World War II in Europe, Linlithgow declared the government of India at war with Germany, an act which enraged the Indian nationalists who maintained that such an important decision should not have been made without first consulting the people. When the All-India congress called for nonco-operation in the war effort, Linlithgow countered by suspending the Indian constitution. He responded to the civil disobedience campaign of 1943 by imprisoning the leaders of the Congress party, including Gandhi. On Oct. 20, 1943, Linlithgow was succeeded as viceroy by Field Marshal Wavell.

Linseed Oil

See VEGETABLE OILS AND ANIMAL FATS.

Lin Sen

Lin Sen (1864–1943), president of China, was born at Foochow, Fukien, in 1864. He was educated by U.S. missionaries and at a private college. He lived in San Francisco for several years and while in the United States became a member of the Kuomintang, then a secret society. Returning to China shortly after the revolution of 1912, he won a seat in the senate of the first parliament—a post he held until 1923. He became a member of the central executive committee of the Kuomintang in 1924, was named to the state council of the national government in 1928, and was vice-president of the legislative Yuan, 1928–31. He succeeded to the presidency of that body in March 1931. Lin Sen became president of the national government in 1932, when a candidate was sought whose position in Kuomintang circles would qualify him to unify dissenting factions of the Nanking government and the Canton group. He successfully bridged the political gap and was revered by the Chinese people as an elder statesman. Despite his high office, he withdrew from the limelight and led a life completely devoid of ostentation. His position as president was a nominal one, for Chiang Kai-shek, who relinquished the presidency in late 1931, still controlled the real reins of government. Lin Sen died in Chungking, Aug. 1, 1943.

Lions Clubs, International Association of

See SOCIETIES AND ASSOCIATIONS.

Lippe-Biesterfeld, Prince of

See BERNHARD, PRINCE.

Liquors, Alcoholic

In Dec. 1933, 14 years of prohibition came to an end in the United States—an interregnum which had a great and decisive influence on the following decade. During prohibition, the production of all alcoholic beverages was at first stopped completely, and sales were permitted for medicinal purposes only. The existing inventories were gradually reduced and by 1928 had reached such a low level that production of limited quantities for medicinal purposes only was authorized under special government

permits. Since four years are generally considered the normal minimum time required for the maturing of most alcoholic beverages, it was not until late in 1937, or rather early in 1938, that the revival of production which began in Dec. 1933 could make itself fully felt.

Therefore, a consideration of the 1937–46 period should include to some extent the status of production and inventories existing in 1933.

The most important alcoholic liquors are whisky, gin, brandy, rum and liqueurs. Whisky is distilled from a fermented mash of grains. In U.S. whiskies, either corn or rye grain predominates. Scotch whisky is made from barley malt which has acquired during its preparation the “smoky” aroma which is its outstanding characteristic.

Gin or geneva had its origin in the Netherlands. English gin, which was at first a copy of the Dutch product but was later made under a modified method, dominated not only the British but also the general world market. London Dry Gin is by far the most popular variety. However, the production and consumption of gin in the United States in normal times is much greater than in England.

Brandy, or specifically “grape” brandy, was recognized for a long time as almost an exclusive product of France, although some other countries such as Spain, Greece and Portugal also produced brandies. In particular, the product originating from the Charente district and which alone is entitled to the designation “cognac” (named after the capital) was considered as a standard for this type of beverage. The production of brandy in the United States was almost entirely confined to the state of California. Before prohibition this product was of minor interest, but brandy as an industry of California later gained steadily in importance until the product had reached a very high quality and reputation.

Next to whisky, rum was for many years the favourite alcoholic beverage in Anglo-Saxon countries. It gradually receded in interest and consumption, however, until it followed gin and brandy in importance. It is a product derived from the distillation of juices obtained from sugar cane or cane products, such as molasses. Originally, it was produced in the West Indies, especially Jamaica, Puerto Rico and the Virgin Islands. Later the production was also taken up on the mainland in the United States, where large-quantity production was reached.

Whisky is by far the predominating alcoholic beverage in the United States. It is produced and consumed in a great many varieties. Bourbon obtained from a mash with a minimum of 51% corn (but usually 60%–80% of this grain) is the most popular. Rye whisky (with not less than 51% of rye grain in the mash) is second in importance and popularity. Other varieties are corn and malt whisky.

Kentucky was traditionally known as the producer of the finest quality of whisky. Gradually much of the production shifted to other states, and differences in quality and reputation were gradually narrowed. Approximate distribution of the product by the various states is as follows: Kentucky 53%; Illinois 17%; Indiana 12%; Pennsylvania 7%; Maryland 6%; other states 5%.

Whisky becomes taxable to the United States government as soon as it comes into existence. The necessity of storing large quantities for many years would make immediate payment economically impossible. For this reason, the United States government permits the delay of tax payment without interest for a period of eight years. This gives the distiller ample time to mature inventories, and in the meantime the distilled spirits are stored in bonded

warehouses under government supervision and cannot be removed except upon tax payment.

Whiskies are bottled either straight or blended with grain neutral spirits which are matured separately by storage in warehouses, either in new or reused barrels. The size and composition of the whisky inventory both influence bottling operations and sales.

When the 18th amendment was repealed in Dec. 1933, inventories of aging whisky were negligible because none had been produced during the 14 years of prohibition other than an inconsequential amount for medicinal purposes. Distillers therefore were faced with the problem of producing much more than current requirements in order to build up inventories for aging and future use. (Normally, whisky is not placed in consumption channels until several years after it has been produced. In large measure, the whisky consumed in 1937 was taken from stock laid away for aging in 1934.) Thus, during the first four years after repeal, the production of whisky exceeded the amount withdrawn from government-bonded warehouses for use by 65,000,000 tax gal. in 1934, 110,000,000 gal. in 1935, 152,000,000 gal. in 1936 and 61,000,000 gal. in 1937, the excess of production in those years representing amounts earmarked for aging.

Production of all distilled spirits showed similar sharp increases, rising from 131,000,000 tax gal. in 1934 to a peak of 293,000,000 tax gal. in 1936 and falling off somewhat to 218,000,000 tax gal. in 1937.

Inventories in United States government warehouses of all spirits rose from 98,000,000 tax gal. at the end of Dec. 1934 to 474,000,000 tax gal. on Dec. 31, 1937 (before computation of losses resulting from evaporation and leakage), whisky comprising approximately 95% of the total.

During this period, foreign producers of beverage spirits were establishing markets in the United States. In reflection of a desire on the part of some consumers for Scotch and Canadian whisky, rum and other foreign specialties, imports of all distilled spirits during 1937 and 1938 were double the 1934 and 1935 amounts (from 7,200,000 proof gallons in each year in 1934 and 1935 to 15,200,000 and 17,100,000 proof gallons in 1937 and 1938, respectively). Whisky imported mainly from Canada and the United Kingdom comprised from 78% to 88% of total imports in the first 4 postrepeal years. By and large, imports had never comprised a significant part of the total distilled spirits consumed in the United States, although during this early period of reconstruction they were helpful in augmenting the supplies of domestic products available for consumption.

The 21st amendment to the constitution, while retaining federal control over manufacture, sale and distribution, vested full rights in the individual states concerning manufacture, sale and distribution within their territory. Some of these states did not vote to adopt a legal sale status until some years after repeal. Thus, although consumption of both domestic and imported beverage spirits rose from 58,000,000 wine gal. in 1934 to 135,000,000 in 1937, this was largely because of the increase in the number of states which permitted the sale of alcoholic beverages (from 28 states at the end of 1934 to 43 states at the end of 1937). In 1946, 3 of the 48 states were still legally "dry"—Kansas, Mississippi and Oklahoma.

During this "reconstruction" period the federal government increased the federal excise tax on distilled spirits from the base of \$1.10 per gallon at the beginning of 1934 to \$2.00 by the end of 1937. The government collected

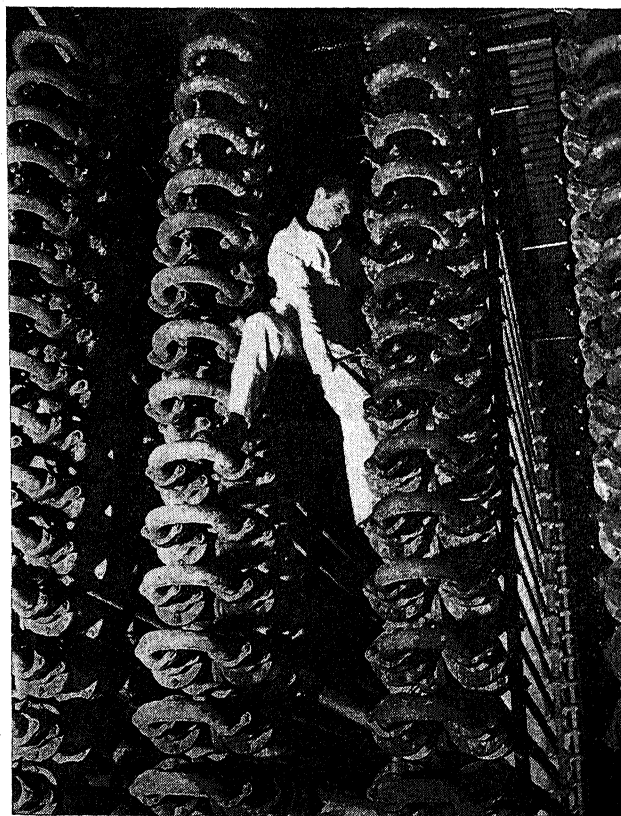
\$68,400,000 in direct distilled spirits taxes in 1934, \$165,600,000 in 1935, \$222,400,000 in 1936 and \$274,000,000 in 1937. In addition, customs duties, licence fees and other revenues from all alcoholic beverages brought the federal government total up to \$417,000,000, \$497,000,000, \$612,000,000 and \$633,000,000 in each of the first 4 years after repeal. Collections of state and local governments rose from \$126,000,000 in 1934 to \$339,000,000 in 1937 on all alcoholic beverages. The money received by the states and their local governments from this source represented a substantial part of their total revenues.

By the end of 1937 distillers had achieved their objective in establishing an inventory of "normal" size which would permit regularly spaced withdrawals adequate for current consumption and regular replacement of such withdrawals by current production.

In 1938, following the industry's achievement of a satisfactory inventory level, production of beverage spirits dropped to 158,000,000 tax gal., a decrease of nearly 28% from the year before. That year saw a minor business recession, and withdrawals showed a decline of 5,000,000 tax gal. from the level of 1937 in reflection of the slackening of consumption generally occurring during periods of declining national income. At the end of the fiscal year 1938, per capita consumption of all distilled spirits had fallen to 1.00 wine gallons from 1.03 wine gallons the year before.

From 1939 to 1941, U.S. national income rose steadily, and the broadening demand for distilled spirits caused an increase in production to 145,000,000 tax gal. in the latter year. The increase was largely the result of factors brought about by the imminence of U.S. entry into World War II. Early in 1941 a few distillers had voluntarily converted their facilities to the production of alcohol needed

Jacketed cooling pipes at a U.S. distillery manufacturing ethyl alcohol. By order of the War Production board, 80 U.S. plants stopped all manufacture of whisky Oct. 8, 1942, to make alcohol for war uses



for ordnance and similar uses and in increasing numbers followed suit in the months immediately before Pearl Harbor.

With the stabilization of the U.S. industry in 1937, the need for supplementary supplies from abroad had decreased, and in 1938 and 1939 imports of all distilled spirits had dropped to 12,000,000 proof gal. in each of these years. Although imports for consumption rose moderately in 1940 and 1941, this was largely because of the increasing amounts of spirits which were brought in from the Caribbean area as World War II cut off European sources of supply.

Scotch whisky shipments remained at a level of about 7,500,000 proof gal. for the 3 years from 1939 through 1941, while Canadian whisky remained at about the 2,000,000-gal. figure during that period.

Per capita consumption, as shown in Table I, increased moderately (from the 1939 level) in 1940 and 1941 to 1.02 and 1.04 wine gallons respectively, reflecting a concomitant rise in all consumer expenditures as recovery from the business recession of 1938 progressed.

Table I.—Distilled Spirits—Apparent Average Annual Per Capita Consumption in the Continental United States (tax gallons)

Fiscal Year	Domestic	Imported	Total
1934*	.30	.03	.33
1935	.67	.03	.70
1936	.73	.08	.81
1937	.90	.13	1.03
1938	.89	.11	1.00
1939	.84	.09	.93
1940	.93	.09	1.02
1941	.96	.08	1.04
1942	1.06	.07	1.13
1943	1.00	.11	1.11
1944	.72	.31	1.03
1945	1.05	.17	1.22

*Includes quantities withdrawn for certain manufacturing, compounding medicinal and sacramental uses.

Source: Computed from official statistics of the U.S. Dept. of Commerce and the Bureau of Internal Revenue.

During the 4 years from 1938 through 1941, there were 3 increases in the federal excise tax rate on distilled spirits—from \$2 per gallon to \$4 per gallon, a 100% increase. During that time internal revenue collections rose from \$565,000,000 in 1938 to \$927,000,000 in 1941.

Five months after Pearl Harbor the Japanese had seized 90% of the world natural rubber-producing areas. The only way to overcome this critical loss was by production of synthetic rubber. One of the basic components of synthetic rubber is butadiene, which may be produced from alcohol.

To insure and safeguard the available sources of supply, the War Production board by mid-Feb. 1942 placed all beverage-distilling plants capable of producing high-proof (190-proof) alcohol on a war production basis. The other distillers produced beverage spirits and high wines (alcohol of 120–160 proof) for conversion into 190-proof war alcohol alternately until Oct. 8, 1942, when the WPB ordered the remainder of such producers to effect complete conversion to war alcohol production.

The year 1942 marked a new postrepeal high in distilled spirits consumption, yet production of domestic whisky and gin fell 43% below the 1941 level.

The first signs of the 1943–44 whisky shortage began to become evident.

During 1942 beverage-distilling plants accounted for more than 40% of total alcohol production. In 1943, when the German U-boat menace was at its height, disrupting the shipment of molasses from which 70%–85% of all industrial alcohol was produced in the prewar years, beverage distillers had converted and enlarged their productive facilities to such an extent as to produce 50.7% of all war alcohol output for the period. From Pearl Harbor

until V-J day, the beverage-distilling industry produced approximately 750,000,000 gal. of war alcohol, according to estimates by the WPB, approximately 50% of the grand total.

Table II.—War and U.S. Industrial Alcohol Requirements (in millions of 190-proof gallons)

	Calendar Years		Change from Previous Year		Change from Previous Year		Change from Previous Year	
	1942	1943		1944		1945		
Synthetic rubber . . .	...	126.0	...	345.0	+173.8%	335.0	-	2.9%
Direct military and lend-lease. . .	71.2	102.9	+44.5%	78.6	-23.6%	89.0	+	13.2%
Indirect military and civilian . .	128.0	147.9	+15.5%	160.3	+ 8.4%	160.0	...	...
Antifreeze. . .	30.0	50.8	+69.3%	30.0	-40.9%	20.0	-	33.3%
Total. . .	229.2	427.6	+86.6%	613.9	+43.6%	604.0	-	1.6%

Source: Compiled by Licensed Beverage Industries, Inc., from data of the War Production Board.

In addition to the production of war alcohol for synthetic rubber, smokeless powder, pharmaceuticals, etc., the beverage-distilling industry continuously manufactured high-protein animal food as a by-product of the distilling process from the grain recovered from the distilling mash. During the distilling process, only the starch is removed from the grain and food values of the recovered feed are considerably increased. During 1945, 609,000 tons of these high-protein feed grains were recovered by beverage distillers for use as livestock, dairy cattle, and poultry feed.

Parenthetically, it is of interest to note that as a result of research and development of certain phases in its own field there resulted another wartime contribution of the beverage-distilling industry in the development of techniques of manufacturing penicillin and other antibiotics. Further progress was also made in the industry's research laboratories on the perfection of techniques of using the by-products of alcohol plants for the making of essential animal food ingredients, corn oil, plastics, dry ice and other chemicals useful for various industrial processes.

From Oct. 8, 1942, until July 1944 U.S. distilleries produced no whisky, gin or neutral spirits for beverage purposes, although quantities were steadily withdrawn for consumption from prewar stocks on hand. During the latter part of June 1944 the WPB announced that because current stocks of war alcohol were adequate for immediate needs, beverage distillers could produce beverage spirits during the one-month period beginning Aug. 1, 1944, the first time since complete industry conversion to war work that distillers had been granted a "furlough."

During that 1-month period, 53,825,134 tax gal. of whisky, gin and neutral spirits were produced, of which 14,100,000 comprised whisky. Output, however, was limited because of a severe drought in Kentucky and a War Food administration ban on the use of corn, a basic ingredient in the manufacture of bourbon. Consequently, no bourbon was made during that period.

In Jan. 1945 the industry was again granted a one-month furlough for beverage production. Improved water supply and limited use of corn brought production for the month to 63,591,261 tax gal. Again in July 1945, because of suspension of shipment of lend-lease alcohol to Russia, collapse of Germany and, again, favourable position of government stock piles of alcohol, registered beverage distillers were allowed to produce beverage spirits during that month.

WPB control over beverage-distilling plants was relinquished on Aug. 31, 1945, but because of the world shortage in all foods the department of agriculture continued

to restrict the amounts and types of grain to be used for beverage purposes. Although distillers were able to make 101,600,000 tax gal. of whisky in 1945 (against a 1-month production total of only 14,100,000 gal. in 1944), inventories were still much less than prewar normal level and distillers were unable to add to inventories in any important degree.

At the end of 1945 net whisky inventories were 270,000,000 gal., as compared with a prewar normal of about 425,000,000 gal. net.

Whisky withdrawals during 1945 were 5½% less than the 1944 volume, largely because of the uncertain production prospects. However, because of the availability of neutral spirits for blending purposes, distillers were able to increase the amount of total bottled whisky to 150,000,000 wine gal. from the 120,000,000-gal. level of 1944.

Table III.—U.S. Production of Distilled Spirits
Production of Whisky, Gin, Rum and Brandy by Beverage and Fruit Distilleries
and Quantities of Neutral Spirits Used for Beverage Production
1934-45

Calendar Year	Whisky	Gin	Rum	Brandy	Sub-Total	Neutral Spirits* Not Production	Grand Total
				(thousands of tax gallons†)			
1934	107,901	4,704	2,172	12,475	127,252	3,683	130,935
1935	184,865	5,899	2,997	18,921	212,682	14,698	227,380
1936	245,477	6,846	2,324	13,472	268,119	24,871	292,990
1937	155,674	6,793	2,477	22,362	187,306	30,925	218,231
1938	95,221	5,841	2,254	26,921	130,237	28,236	158,473
1939	87,360	6,305	2,433	18,907	115,005	30,168	145,173
1940	111,699	5,250	2,384	25,631	144,964	33,497	178,461
1941	135,182	6,234	3,199	28,944	173,559	41,011	214,570
1942	76,570	3,647	2,430	14,896	97,543	45,419	142,962
1943	0	16	2,267	21,352	23,635	27,720	51,355
1944	14,379	1,032	2,584	24,361	42,356	47,486	89,842
1945	101,624	5,548	2,766	34,066	144,004	78,682	222,686

*These data represent quantities of alcohol and high-proof spirits used in rectification. These provide a more accurate indication of beverage neutral spirits since in normal times quantities of spirits produced in registered beverage distilleries are diverted to nonbeverage uses.

†Tax gallon is the unit of spirits subject to the federal excise tax. Beginning April 1944, the rate was \$9 per gallon of 100-proof which is a standard gallon containing 50% of ethyl alcohol by volume.

Source: Alcohol Tax Unit, U.S. Bureau of Internal Revenue.
Compiled by: Licensed Beverage Industries, Inc.

The impact of the war years adversely affected U.S. import relationships also, since the principal foreign whisky exporters (Great Britain and Canada) were compelled to convert plant facilities for war requirements and to curtail shipments. This was particularly true in the United Kingdom, where distillation of beverage spirits was suspended for a five-year period from 1940 through 1944. Scotch whisky, normally the largest item in distilled spirits imported into the United States, suffered a sharp decline as a direct result of cessation of production by the grain distillers in Scotland in 1939; distillation of malt whisky had stopped by the end of Feb. 1940 (see below).

Although WPB control over the beverage-distilling industry facilities was relinquished on Aug. 31, 1944, the department of agriculture, because of reported world grain shortages, made only monthly allocations of grain for beverage use which sharply restricted production—6 days during September, 7½ days each during October and November and 10 days during Dec. 1945 and Jan. 1946. Beginning in Feb. 1946, however, the allocation trend was again reversed and the department of agriculture reduced the grain allocations to the industry in successive months, finally to a three-day-a-month basis in June and July.

At the end of the war, as previously noted, inventories of aging whisky were still abnormally low and, in a broad sense, distillers found themselves in much the same position as they were at the end of prohibition. The absence of beverage production during the war had depleted inventories and dislocated aging schedules. Inasmuch as it

normally takes four years to mature whisky, if the industry were permitted to resume full-scale, regular production in 1946, it would not be until 1950 that normal inventories and supply conditions could be established.

Continuing grain shortages indicated that the same distortions in domestic supplies and importations which existed during the war years might continue for some time. With the reopening of certain other sources of supply (notably France) as a result of the end of the war, various brandies and liqueurs again appeared on the U.S. market. However, since the volume of all imported spirits generally consumed in the United States had never bulked very large, these new influences probably would not markedly add to current supplies.

The wartime disruption of the U.S. and foreign distilling industries caused a decline in per capita consumption figures from 1.13 wine gallons in 1942 to 1.11 and 1.03 gallons in 1943 and 1944, respectively.

In Nov. 1942, the excise tax rate on distilled spirits was increased to \$6 a tax gallon and again, in April 1944, the rate was increased to \$9 a gallon, 718% more than the rate in effect when prohibition ended in Dec. 1933. These unprecedentedly high rates resulted in new peak revenue collections for the federal government to \$1,200,000,000 in 1942, \$1,500,000,000 in 1943, \$2,100,000,000 in 1944 and \$2,400,000,000 in 1945. (A. J. LI.)

U.S. Liquor Control.—During the decade 1937-46 the progress of liquor control in the United States was marked by four important developments: (1) increase in revenues from alcoholic beverages by taxation; (2) enlargement of the scope and detail of control; (3) greater recognition of the social implications incident to the trade in liquor, with heightened vigour in the attempt to eliminate abuses and (4) effort, along scientific lines, to understand the causes of alcoholism and excessive drinking, and to provide for the care and cure of alcoholics. The methods of control fell into three categories: Increase in taxes and licence fees; federal, state and local control and self regulation by the industry. The abuses which led to the extension of control may be summarized as follows:

Drunkenness and excessive drinking. In 1946 there were estimated to be in the United States 50,000,000 moderate drinkers; approximately 2,000,000 excessive drinkers and about 600,000 alcoholics.

Sales to minors. This was mainly an administrative problem since such sales were forbidden in every political subdivision under local or state control.

Antisocial conditions in taverns. This involved the tavern as a place of unwholesome atmosphere, sometimes demoralizing, especially to young men and women, and a gathering spot for the outlawed and rejected of society—hoodlums, prostitutes, petty thieves, bootleggers and so forth.

There were other abuses of almost equal magnitude, among which were bootlegging, dilution, subsidization by supplier of retailer and illegal labelling.

An outstanding development which many students of the problem viewed with alarm, was the concentration of the industry, particularly marked in the case of the distillers and less so in the brewing and wine industry. Four big distillers dominated distilling, having absorbed 35 smaller concerns during the decade. Only five large independents were left, and about 100 smaller concerns were operating. Such a concentration, it was feared, might easily pose new and difficult problems of control. However, the producers showed a marked willingness to cooperate with law-enforcing authorities and also exhibited an awareness of their social responsibilities. This was also true of the large brewers and vintners.

The number of breweries decreased during the decade

from more than 1,200 to 466. In 1946, only 7 produced more than 1,000,000 bbl. annually apiece.

The distillers entered extensively into the wine field, and by 1946 controlled about 20% of the production and storage, almost entirely in California, which produced 90% of the nation's wine.

Centralization of the industry was accompanied by tremendous technological improvement and increase in facilities for production. The four largest distillers alone could produce all the distilled spirits the country could consume. By-products became highly important both in the distilling and brewing industries. The federal government in its program of grain restriction during 1945 and 1946 allowed only those plants with the necessary equipment and ability to process the by-products effectively to share in the grain allocation.

After repeal, federal excise tax rates increased as shown in Table IV.

Table IV.—U.S. Federal Tax Rates
(per gallon)

Year	Distilled Spirits*	Malt Beverages	Wine 14%–21%
1933	\$2.10	19 cents	20 cents
1934 (Jan.)	2.00	16	No change
1936	No change	No change	10 cents
1938 (July)	2.25	No change	15 "
1940 (July)*	3.00	19 cents	18 "
1941 (Oct.)	4.00	No change	30 "
1942 (Nov.)	6.00	23 cents	40 "
1944 (Apr.)	9.00	26 "	60 "
1945	No change	No change	No change
1946	No change	No change	No change

*From July 1940 to Oct. 1941 brandy was \$2.75, not \$3.00. Otherwise rates are the same.

State taxes did not show a similar increase. In 1946 they ranged from 50 cents a gallon in the District of Columbia to \$2.72 in South Carolina. The average was about \$1. The rate in 1946 was \$1.50 in New York, \$1.28 in Texas, \$1 in Illinois, 80 cents in California and \$2.08 in Indiana.

Licence fees showed great variation, with the trend steadily upward in amount. There were local licence fees, state licence fees, sometimes one or the other and frequently both.

Federal revenues represented five-sixths of the total, the state revenues almost one-sixth. Local revenues were less than 10% of state revenues. In estimating the state revenues, sales taxes, levied in some states on all articles sold to the public, were not included.

In addition to these revenues there were import duties. In time of domestic shortages, as in 1943 and 1944, these approached the \$100,000,000 mark.

The enormous increase in taxes is shown in Table V. It was, of course, absorbed in its entirety by the consuming public. In a number of states liquor taxes were allocated

Table V.—Federal, State and Local Government Revenues from Alcoholic Beverages
(Calendar Year 1934 Through First Quarter 1946)

Calendar Year	State and Local Government	Total Federal*	Grand Total Federal, State and Local
1934	\$ 125,795,703†	\$ 416,566,163	\$ 542,361,866
1935	177,311,209†	496,937,877	674,249,086
1936	252,345,476†	611,645,166	863,990,642
1937	339,346,183†	632,929,544	972,275,727
1938	317,786,826†	599,490,258	917,277,084
1939	376,589,974	635,786,935	1,012,376,909
1940	419,689,642	753,364,606	1,173,054,248
1941	472,681,237	957,199,778	1,429,881,015
1942	541,680,265	1,245,226,743	1,786,907,008
1943	511,362,796	1,518,201,725	2,029,564,521
1944	576,716,222	2,167,952,875	2,744,669,097
1945	662,000,000†	2,412,173,518	3,074,173,518
First quarter 1946	207,000,000†	654,499,640	861,499,640
Total	\$4,980,305,533	\$13,101,974,828	\$18,082,280,361

*Includes customs duties.

†Excludes administrative and collection costs.

‡Estimated.

Note: These data include monopoly state profits on sales of alcoholic beverages as well as proceeds of excise taxes, licence fees, etc.

Sources: Bureau of Internal Revenue, Treasury Department; Distilled Spirits Institute; Licensed Beverage Industries, Inc.

to particular purposes, such as road building, care of state institutions, etc. Federal liquor taxes were not allocated to specific purposes. A movement sprang up to allocate a portion of the tax revenue to the establishment of clinical facilities for alcoholics, to study and research.

Establishment of the Office of Price Administration in 1941 was the most important single piece of control legislation, federal, state or local, since repeal. It was a boon, financially to the industry. OPA set ceiling prices upon all alcoholic beverages; in some cases this was a flat price; in others it was based upon percentage mark-ups; the latter system was much the more commonly used. Roughly there was flat pricing for the distillers, based upon the age of the whisky and the proof; the distributors' mark-up over cost was 15% and the retailers' mark-up 33½%, with variations in the case of cordials, wine and beer.

The fixed margins of profit given the distributors and retailers were greatly in excess of those of peacetime. Between 1942 and 1946, the economic position of the distributor, as well as that of the distiller, was strengthened to a remarkable degree. The retailers likewise enjoyed great prosperity as evidenced by a large increase in the number of retail licencees, for both taverns and package stores.

The individual states took little part in OPA. They left it to the federal agency to dictate the policy, lay down the rules and take charge of the administration.

While OPA stabilized the entire industry, it also gave rise to a tremendous black market, which flourished in spite of vigorous governmental attempts to curb it. Instead of illicit stills, bathtub gin, bootleg liquor either fraudulently labelled or not at all, violations consisted of payments of more than ceiling prices. This was generally in cash, under the counter, not reported in income tax returns.

The trend during the decade 1937–46 was away from local and toward state control. This was continuous, but not rapid, with many exceptions and reversals. Cities as a rule considered local control of liquor a part of their home-rule program and were loath to give up power to a centralized authority. Most students agree that state governing bodies are less subject to political pressure than are local authorities; hence, enforcement is stricter and more equitable. On the other hand, the local authority has a substantial police force, frequently greater in number than the agents of the state authority; the same holds true in unincorporated areas where the sheriff and his deputies are the chief enforcing authorities. Co-operation between the different bodies was often half-hearted and casual.

The tendency toward centralization of control authority in the state was exemplified by the laws of California and New York, generally credited as being the best systems. In New York the state issued all liquor licences, including retail. The local political unity could make recommendations, but the final decision rested with the state body. Retail licences for sale by the drink were issued only for premises where meals were regularly served by the licensee. This tieup of the sale of liquor by the drink with the restaurant business worked well. In California the state authority had sweeping powers. The result was a more satisfactory control system.

In most of the states the authority was divided during the decade between state and local bodies, as in Illinois. In Wisconsin, with some exceptions, the local authority issued the licences.

Division of control had many objections. Each body was jealous of the other. Instead of supplementing they tended to neutralize each other.

A great residue of sentiment against the sale of liquor remained after repeal. In one group were the drys who thought repeal was a disaster and who directed their efforts toward the drying up of specific areas. In another were those who believed the sale of liquor should not involve private profit. Three states—Mississippi, Kansas and Oklahoma—decided to remain dry except for beer. Liquor was, however, sold in those three states through the working of the Federal Liquor Dealers Tax Stamp system.

Following were the principal methods by which, during the ten years 1937-46, the individual states attempted to control the distribution and sale of liquor.

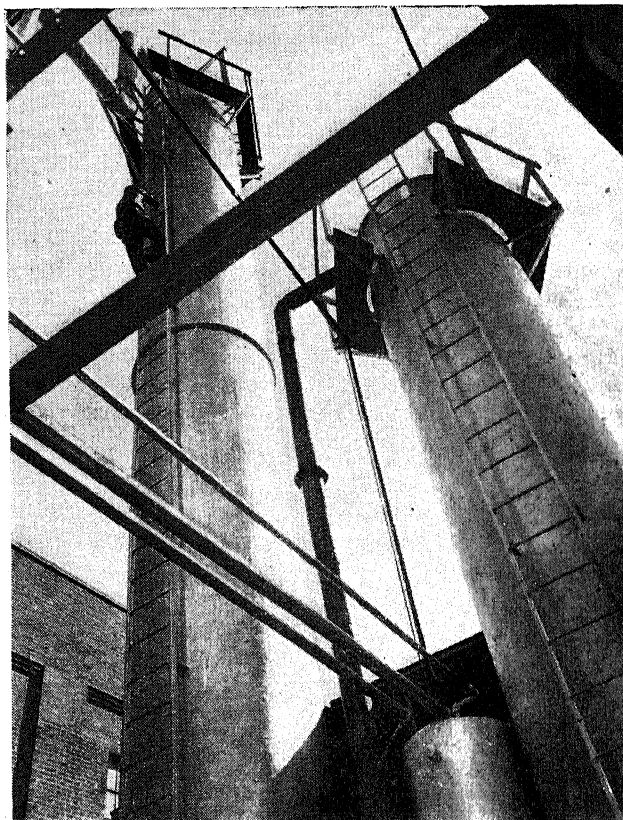
Monopoly System.—Seventeen states between 1933 and 1938 adopted the so-called monopoly system and still retained it in 1946. They were: Alabama, Idaho, Iowa, Maine, Michigan, Montana, New Hampshire, North Carolina, Ohio, Oregon, Pennsylvania, Utah, Vermont, Virginia, Washington, West Virginia and Wyoming. Although bills for the adoption of this system were introduced in practically every one of the licence states during the decade 1937-46, no state adopted it during that period.

The monopoly system had many variations. In nine states—Alabama, Idaho, Iowa, North Carolina, Oklahoma, Utah, Virginia, Washington and West Virginia—on-premise sale by the drink was forbidden. In all of them except one the sale of liquor by the package or bottle was carried on solely in state stores or agencies. In some, state stores and private licencees existed side by side. Thus Michigan, a monopoly state, operated its own liquor stores and had agencies; in addition it issued licences to retail outlets selling beer and to still others selling beer and wine. Only in rare cases did the monopoly system extend to beer and wine. In Oregon the monopoly was for wholesaling only. In most of the states, warehouses for storage were owned by the states which were the only wholesalers; where dual systems existed, both the state stores and the private licencees bought only from the state wholesale agency. Other variations existed. Ohio, for example, issued permits allowing unlicensed persons to buy supplies from without the state.

In all cases the system proved enormously profitable. Its advocates claimed that state store ownership eliminated sales to minors and greatly reduced drunkenness. State control, it was argued, had given the retail liquor business a respectability which it lacked elsewhere.

Against the system, it was argued that the state authority devoted its attention to profit rather than control, to the neglect of the latter; the state stores provided a pool of employees who might quickly be involved in the political machinery and become party workers for the party in power. The jobs might become political plums and increase the patronage by which the "ins" could entrench themselves. In answer, the proponents said civil service obviated the situation complained of. The most frequent argument, however, was that the monopoly system was an infringement upon free enterprise and represented an encroachment by the state into a field as alien to it as the grocery or drugstore business. It was also claimed that under the licence system more labour was employed and more money earned, the circulation of which did the state more good than the revenue derived from state stores.

Local Option.—Local option is the system by which a political subdivision can forbid the sale of alcoholic liquor



One of the distilleries which operated seven full days per week to supply an annual average of 250,000,000 gallons of ethyl alcohol used during World War II for smokeless gunpowder, synthetic rubber, antifreeze for military vehicles and other war materials

or particular kinds of alcoholic liquor (beer is often excepted; beer and wine less frequently so; packaged liquor in many instances) within its own boundaries. All of the states, except Arizona, California, Indiana, Iowa, Idaho, Kansas, Nevada, North Dakota, Oklahoma, South Carolina, Utah and Wyoming, allowed some form of local option election in 1946. Twelve other states either would not permit a vote on beer, or exempted it from vote, up to a certain percentage of alcoholic content.

As of July 1, 1946, out of 18,391 elections since repeal, the drys had won in 11,243, about 61%. In the decade 1937-46, and particularly in the last five years of that period, the pace slowed down, although after the end of World War II it showed signs of acceleration.

Between 1940 and 1946, out of 7,591 elections, the drys won 4,293, about 58%. The average number of contests per year was about 1,250. During the 6 years ending with 1939, out of 10,800 contests, they won 6,950 or 64%. The average number of contests per year was 1,800. The movement had its greatest force in the years immediately following repeal. About 18% of the entire population of the United States lived in dry areas in 1946.

Local option had little success in the large cities. In Chicago, out of more than 3,000 precincts, 128 were dry in 1946. Gains were chiefly in the south and in rural areas. In 1945 Nebraska rejected prohibition in a state-wide election. In Kentucky, where one-half of the nation's whisky was made and stored, 80% of the counties were dry.

The argument against local option was that the automobile had made it easy for the drinker to buy outside the limits of the local option area. It was also argued that it stimulated bootlegging. On the other hand, when an election had been won by the dry side with a substantial

majority, so that the system had the weight of preponderant public opinion behind it, drunkenness and other attendant evils showed a perceptible tendency to decline.

Greater Care in Licensing.—Much of the abuse at the retail level was the result of the lack of discrimination in the issuance of licences. The ten-year trend was to give the licensing body more discretion in the granting and denial of licences. Investigation before licence issuance became more detailed and thorough. In spite of this the infiltration of undesirable elements who later did much to augment the problems of enforcement was not prevented. The applicant for licence was not always the actual operator, a fact not discovered until after the issuance of the licence.

On- and Off-Premise Sales.—A distinction made shortly after repeal and prevailing in a majority of states in 1946 was that between licences permitting the on-premise sale of liquor by the drink and the off-premise sale of packaged liquor. Under this system a tavern could not sell by the bottle, nor could a package store sell by the drink. The contention was that this classification simplified control. The brewers had long advocated a low-fee licence which would permit off-premise sale by the bottle in groceries, delicatessens, parking stations and other retail outlets. Many states were cold to this proposal. In the ten years 1937–46 the tendency was toward refinement of classification, with differences in fees but without enlargement of the total number of licencees. In five of the licensed states—Arkansas, Georgia, South Carolina, Tennessee and Texas—on-premise sales by the drink were not allowed.

Licence Limitation.—Legal limitation of the number of retail licences in a political subdivision gained in popularity as a control device during the decade. Often this was by fixed number; more frequently it was based on proportion to population, such as 1 to 1,000. Some cities placed minimum limits in linear feet between taverns. Most communities kept taverns out of residential districts. In some cities, the municipality was divided into zones, with different limitations in the various zones.

It was contended that lessening the number of licensed establishments increased the value of the licence; the holder became unwilling to jeopardize it by any action which would violate the law or result in unfavourable public reaction. Its advocates claimed that it promoted sobriety.

Opponents argued that it amounted to a subsidy to those already in business and was an unfair bar to newcomers desiring to enter the field. Where there was vigorous competition, in the absence of limitation, the financially weak operator might be driven to antisocial practices in an effort to stay in business. A practical difficulty was reduction in number after limitation was established. If a man died, his widow generally wished to carry on; insolvencies were extremely rare; revocations were infrequent.

State Fair Trade Practice Systems.—Fair trade practice systems gained greatly in popular acceptance during the ten-year period 1937–46. This was a plan to prevent discrimination, as to prices, discount and services, among the units at each of the different levels of the industry. Prices and other relevant information were required to be posted each month with the control authority, a copy displayed on the premises of the individual or firm and the price lists made available to all. Penalties were imposed for selling at other than the posted prices. Most of the systems provided that the price of every item sold or offered for sale should be posted.

In its most effective form, the system applied to the pro-

ducer (to post his prices to the distributor), the distributor (to post prices to the retailer) and the retailer (to post his prices to the consumer).

After the beginning of World War II there was little price competition. Most observers agreed, however, that the period of stiff competition would again set in. When and if this happened, fair trade practice systems would be extremely valuable in avoiding price wars and ruinous competition, both inimical to moderation.

Some producers developed fair trade practice systems of their own, legal under state statutes; in their contracts with their retailer customers, minimum prices were named at which the producers' merchandise could be sold.

Labelling.—A comprehensive system of federal labelling of all alcoholic beverages was developed during the decade 1937–46. Many states adopted the federal regulations *in toto*, and some added supplementary regulations of their own. Still others departed from the federal rules as well as making additions. This resulted in a great deal of confusion, because of the rapid and easy movement of alcoholic merchandise from one state to another.

Uniformity of labelling among the various states, although it found many advocates, did not make much headway. Special situations existed in particular states; it was difficult for the federal government to take cognizance of these in adopting a general code.

Trade Barriers.—Ports of entry, preferential fees and taxes favouring industries within the states and other trade barriers diminished greatly during the ten years. Those remaining were weakening under the barrage of argument against them.

By the 21st amendment to the federal constitution, states were given exclusive jurisdiction over matters involving alcoholic beverages within their own borders. The meaning of this was the subject of numerous and often conflicting decisions by the courts. The significance of the phrase "the police power of the states" was herein involved. During the decade 1937–46 the federal authority steadily extended its scope, until it seemed firmly established that federal control extended over liquor in interstate commerce. Its authority in intrastate matters constituted highly controversial ground.

The Federal Tax unit, successor to the Federal Alcohol administration, both under the secretary of the treasury, department of internal revenue, laid down nation-wide rules for labelling, advertising, signs, subsidization and so on. Many states passed their own laws covering the same fields. These were by no means always identical.

During World War II little opposition manifested itself to the extension of federal control, but the volume of protest grew greatly in the postwar period. However, the states did not meet what many of them considered the threat of federal control, in defiance of the 21st amendment, in any organized fashion. Where the states did not specifically pass statutes and the control bodies did not pass regulations, the federal rules applied.

In the fields of licensing and policing, state and local autonomy were preserved. A large factor in determining the future direction of control would be the efficiency, or lack of it, with which the states were able to regulate abuses in the industry itself. It was proposed that the federal government issue licences. Under OPA, while individual licences were not issued, the enabling act by its terms constituted a federal licensing system covering all persons in the liquor field.

The government issued basic permits to all distributors

which in effect were licences. It also issued, purely as a revenue measure, retail and wholesale liquor occupational tax stamps. These stated clearly that they were not licences, but in practice they were used as such by persons unwilling or unable to secure local or state licences. This grew to be a real evil, especially flagrant in the three dry (except for beer) states. The number of these stamps sold far exceeded the number of licences issued.

Charles J. Fleck, chairman of the Illinois Liquor Control commission, led a movement to change the law so as to forbid the issuance of these stamps to persons not possessing local and state permits or licences.

No discussion of liquor control would be complete without mention of self control by the industry, begun shortly after repeal and developed by organizations in all branches of the liquor business during the decade 1937-46.

In the so-called Nebraska plan, the brewers set up a threefold system. First was an attempt at persuasion to bring the antisocial tavern keeper into line. The brewers employed field representatives for that purpose; if this did not work, complaint was made to the law-enforcing authorities; if this did not bring the desired results, supplies were to be cut off. In practice the third and final step was never taken. The difficulty was that the retailer would always find someone, or so it was feared, who would sell to him.

Each state and each locality had its own tavern and package-store organization; there were also national associations. These organizations, whose members constituted the great law-abiding majority, lost no opportunity to proclaim their devotion to the principles of moderation and law enforcement.

The wholesalers had similar organizations. Allied Liquor enterprises did excellent work, both in the matter of education and the promotion of law enforcement. The Conference of Alcoholic Beverage Industries, composed of almost all the leading distillers, ran numerous advertisements in the general and liquor press urging no sale to minors, obedience to rule on closing hours, doing away with antisocial conditions and participation in community activities. The Distilled Spirits institute, also an organization of distillers, represented the industry at Washington, D.C., and published factual matter of great interest and value. During 1946 Allied Liquor enterprises and C.A.B.I. combined into a new organization, Licensed Beverage Industries, Inc.

The brewers and beer distributors in some instances showed great awareness of the social implications of their business by adopting a policy of shutting off sales of merchandise to taverns about which complaints had been received and verified. This probably was the most hopeful tendency in liquor control during the decade.

The prevalent thinking of the decade in the United States was that the sale of alcoholic beverages should not be prohibited unless it was found impossible to control their sale effectively. All efforts at self regulation had the necessity for effective control clearly in mind. The low position of the tavern business in the social scale was involved; the attempt was made to improve this position and offset the disapproval of a large and vociferous group by increasing the tavern's respectability.

If public opinion within the industry could be mobilized so as to make it difficult or impossible for the anti-social operator to get merchandise, many students of control were optimistic as to the resultant rise in public esteem.

New concepts of alcoholism, slowly developing during

the decade 1937-46, affected both the philosophy and methodology of liquor control. State authorities became generally aware of the alcoholic as a sick man; this recognition was largely the result of the educational influence of physicians and psychiatrists, who were mainly instrumental in the establishment of clinics in major U.S. cities, conducted under medical auspices. New Jersey appropriated \$500,000 in 1945 for the creation of institutional facilities and for research. The movement to devote a fraction of states' revenue from taxation of alcoholic beverages to the cure and care of the alcoholic was well under way.

Among important developments were establishment of the Yale school for the study of alcoholism. This school had a tremendous influence upon the habits of thinking of church and similar groups. It had been customary to approach the problem from an emotional standpoint, reflected to a large measure in the textbooks used in the public schools. The Yale lectures, published in a volume entitled *Alcohol, Science and Society*, substituted the approach of reason and impartial scientific analysis for the partisan approach previously in vogue.

Two principal schools of thought concerned themselves with the matter of method of treatment for the alcoholic. Alcoholics Anonymous emphasized the religious motif. The members of this organization sought to effect cures by association with alcoholics, who did not resent their injunctions because the members themselves were reformed alcoholics. Alcoholics Anonymous emphasized reliance on the divine, self-surrender on the basis of faith and trust.

The therapeutic school, on the other hand, divorced the cure from religious association. It combined medical treatment, including long periods of rest, sometimes shock treatment, with an effort to discover and remove the causes of the psychosis. (M. L.B.)

Great Britain, Commonwealth and Europe.—The earlier part of the decade 1937-46 was in the main uneventful in relation to the alcoholic liquors which were so commonplace a feature of everyday life. One or two interesting features were worthy of note; viz., in the United Kingdom the consumption of spirits per head of the population in the years 1937-46 was only one-quarter of what it used to be 4 decades earlier: it fell from 0.87 gal. in 1908-09 to 0.22 in 1938-39. The corresponding figures for the consumption of wines varied in a different manner and might almost be regarded as an index of national prosperity; in the year ending March 31, 1927, 18,720,581 gal. were consumed, in the year ending March 31, 1933, 12,583,153 and in the year ending March 31, 1937, 16,337,783.

With the coming of 1940, as was to be expected, vast changes occurred. Moselles and hocks disappeared from the markets. As shipping, railway and road transport were required for the movement of troops, munitions of war and vital goods, wines and spirits were not carried to their usual markets. Scottish distilleries were not allowed to have grain, and production of whisky ceased. As European countries were overrun by the Germans, they too were unable to continue to supply their types of liquors. But Spain and the south of France still harvested grapes and recorded vintages; their wines, however, did not become available to their former consumers.

It was then that one heard of "hooch"—drink containing methyl alcohol—and of the casualties ensuing from its abuse. After the liberation of North Africa, prominence was given to the fact that Algeria could produce good wine, a fact which had been assiduously suppressed by vested interests in the vineyards of France; this Algerian wine was quietly disposed of by running it through patent stills to produce plain spirit or industrial alcohol. It was

about this time, too, that many people could not obtain cognac for invalid relatives; but a few of the more fortunate were able to acquire a small quantity of South African or Australian brandy and realized that the vinous distillates from the commonwealth were not to be despised.

The connoisseur's palate could not generally attain that satisfaction to which it was accustomed in prewar days since imports and exports were controlled in a manner that ignored the niceties of vintage variations; sherry was sherry without qualification, and it was "pipe-lined" to its destination with no regard to subtle variants; the same treatment was accorded to other wines.

For hock and moselle vintages, 1937 was the best year since 1934; but the yield was small and by 1946 nothing was known of 1940 to 1945 vintages. In 1938, 1943, 1944 and 1945, claret was of good quality though the yields were small. Burgundy was at its best in 1937, 1940, 1943, 1944, 1945, but only in 1940 was the quantity abundant; 1945 was a *grand vin* year for champagne, and in 1937 there was a moderate yield of good wines; but neither could surpass the 1934 vintage. Port vintages were at their best in 1935, 1938, 1940 and 1942 with small yields. Quantities of sherry produced were also generally small; but qualities were notably good in 1937, 1938 and especially in 1945. The three best years for brandy were 1937, 1943 and 1945 though the last year was a rather short one; the record year 1875 still remained unsurpassed, and there still existed specimens of some of the brandy vintages of 1878, 1884, 1899, 1906, 1911, 1914, 1919, 1922, 1926 and 1928, but they were not ordinarily obtainable.

South Africa and Australia continued to progress as wine-producing regions, thanks in no small measure to "imperial preference" duties in the United Kingdom. The quality of their wines and spirits steadily improved, and the demand for them was notably increasing; an important factor in this development was a consistently high standard of vintage; climatic conditions are less erratic than those obtained in various European continental regions. (See also BREWING AND BEER; INTOXICATION, ALCOHOLIC; WINES.)

(R. SE.)

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Lisbon

The capital of Portugal covers an area of c 22.6 sq.mi. The resident population was 594,390 in 1930, and 709,179 in 1940. This increase rendered necessary the promotion of developments by both the government and by the municipality. The number of blocks of flats and buildings was 43,630 in 1940; of these, 2,630 privately-owned blocks of flats were built during the decade. The housing shortage was being felt in Lisbon as in all large cities, and the influx of population from outside as well as the increase in the resident population brought about the emergence of improvised dwellings and slums on the outskirts of the town. The state for some years had been undertaking the construction of many residential quarters for the poorest classes and of temporary houses to replace these slums and provide housing in good healthful conditions. In the residential quarters, 2,540 structures had been built up to 1942, while of the temporary houses 1,500 had been put up. Lisbon municipality in 1946 had under urban develop-

ment in the northern part of the city an area of about 495 ac. allowing for the accommodation of 50,000 persons in 15,000 comfortable, hygienic and inexpensive dwellings. They were not to be houses for the poorest classes, but low-rented houses for the middle classes. Side by side with this social work, Lisbon had been provided in the years 1928-46 with fine large buildings for housing the public services, for improving communications and for sporting events. Schools, buildings for post and telegraph offices, the mint, the national institute of statistics, the higher technical institute, the River station, may be mentioned, as also the national stadium with seating accommodation for 60,000. Reference should also be made to the restoration of structures of a monumental character such as the national museum of ancient art, the national assembly (palace of S. Bento), and the castle of St. George, the city's historic fortress.

Hospitals received careful attention from the government, many improvements having been introduced into those already existing, and new ones having been built, among them the medical faculty hospital for 1,500 beds, nearing completion in 1946, the cancer hospital, the school of nursing, etc. In 1926, the number of cases treated in Lisbon's hospitals was 40,487; in 1943 this figure had risen to 141,179.

Another task completed in Lisbon in the decade was the park of the Serra de Monsanto, a hill rising to the east of the city and connected to the centre of Lisbon by a bridge across the valley of Alcantara. The area planted and sown already covered over 2,000 ac. Work was also under way in 1946 for the new park in the centre of the city—the Edward VII of England park—which was planned to have an area of about 95 ac. Part of it was already a fine garden which included the famous *Estufa Fria* (cool green-house). Also notable were the improvements to the water supply, the sewage system, the markets, and a number of important urban developments which had been completed or were in the course of completion in the Portuguese capital: Empire square facing the church of Jeronimos, the 28 de Maio park (formerly the *Campo Grande*) and the immediate neighbourhood of the palace of S. Bento. (P. C. Ms.)

List, Siegmund W. W.

List (1880–), German army officer, was born in Oberkirchberg, Bavaria. He attended the military academy in Munich, graduating in 1898, and was commissioned a lieutenant in the Bavarian army in 1900. During World War I he was a captain on the Bavarian general staff. In 1930 he was made commander of the infantry school at Dresden, and in 1934 Adolf Hitler appointed him commander of the 4th army district of Dresden. After the Austrian *anschluss* in 1938, he was put in charge of the Austrian army. He was the general in command of the armies of occupation of Czechoslovakia in Oct. 1938, and was named governor of Moravia in 1939. He played an important part in the conquest of Poland in Sept. 1939 and was made a field marshal by Hitler after the campaign in France, during which he was commander of the 12th army. Marshal List was in command of German armies on the Moscow front during the Russo-German campaign of 1941. In early battles his forces pressed beyond Mzhaisk in the drive on the soviet capital, but powerful Russian counterdrives compelled him to retreat in the winter of 1941. In Sept. 1942 List succeeded Von Bock as commander of German armies in the central sector. In May 1945, List was captured by U.S. 7th army troops.

Literary Prizes

Some of the more important literary awards made during the decade 1937-46 were as follows:

United States

1937.—ACADEMY OF AMERICAN POETS (\$5,000): Edwin Markham. AMERICAN HISTORICAL ASSOCIATION. GEORGE LOUIS BEER PRIZE (\$240): Charles Wesley Porter, *The Career of Theophile Declasse*. JEAN JULES JUSSERAND MEDAL: Samuel E. Morison, *Tercentennial History of Harvard*. JUSTIN WINSOR PRIZE: Carl Bridenbaugh, *Cities in the Wilderness*. COMMONWEALTH CLUB OF CALIFORNIA awards to California authors. Gold medals: John Steinbeck, *In Dubious Battle* and Herbert E. Bolton, *Rim of Christendom*. Silver medals: Hartley B. Alexander, *God and Man's Destiny*, Julia C. Altrochi, *Snow-covered Wagons*, and George Ripley Stewart, *Ordeal by Hunger*. JULIA ELLSWORTH FORD CONTEST for *Children's Literature*. First prize (\$2,000): Benson Wheeler and Claire Lee Purdy, *My Brother was Mozart*. Second prize (\$1,000): James Hull, *Stage-struck Seal*. GUGGENHEIM FELLOWSHIPS: Dorothy Bethurum, Louise Bogan, Sterling A. Brown, Harold L. Cook, Donald Culross Peattie, Frederic Prokosch, Sonia Raiziss, Jesse Hilton Stuart. HARPER PRIZE NOVEL: Frederic Prokosch, *Seven Who Fled*. HOUGHTON MIFFLIN LITERARY FELLOWSHIPS (\$1,000 in addition to royalties and advances): Dorothy Baker and David Cornel De Jong. LITTLE, BROWN & CO. CENTENARY PRIZE: Odell Shepard, *Pedlar's Progress*. LITTLE, BROWN & CO. NOVELETTE PRIZE (\$2,500): Wallace Stegner, *Remembering Laughter*, MEGRUE PRIZE (\$500, Dramatists' Guild, New York): Arthur Kober, *Having Wonderful Time*. NATIONAL BOOK AWARDS FOR 1936 (American Booksellers Association): Margaret Mitchell, *Gone with the Wind*; Victor G. Heiser, *An American Doctor's Odyssey*; Van Wyck Brooks, *The Flowering of New England*; Della T. Lutes, *The Country Kitchen*; Norah Loftis, *I met a Gypsy*. NATIONAL INSTITUTE OF ARTS AND LETTERS. Gold medal: Charles McLean Andrews. NEW ENGLAND POETRY SOCIETY PRIZE: John Hall Wheelock, *Poems, 1911-36*. JOHN NEWBERY MEDAL (most distinguished children's book): Ruth Sawyer, *Roller Skates*. O. HENRY MEMORIAL AWARDS (best short stories): first prize (\$300), Stephen Vincent Benet, *The Devil and Daniel Webster*; second prize (\$200), Ellick Moll, *To Those who Wait*; third prize (\$100), Robert M. Coates, *The Fury*. POETRY (magazine) PRIZES: W. H. Auden, Louise Bogan, Thomas H. Ferril, Franklin Folsom, William Pillin, Roger Roughton, Stephen Stepanchev. PULITZER PRIZES (\$1,000 in each class): novel, Margaret Mitchell, *Gone with the Wind*; play, Moss Hart and George S. Kaufman, *You Can't Take it with You*; history, Van Wyck Brooks, *The Flowering of New England*; biography, Allan Nevins, *Hamilton Fish*; poetry, Robert Frost, *A Further Range*. THEODORE ROOSEVELT MEMORIAL AWARD (\$2,500, Doubleday, Doran): Dean Alfange, *The Supreme Court and the National Will*. EDWIN WOLF NOVEL PRIZE (\$2,500, Jewish Publication Society of America): Beatrice Bisno, *Tomorrow's Bread*.

1938.—JOHN ANISFIELD PRIZE (\$1,000): Elin L. Anderson, *We Americans*. BOHNENBERGER MEMORIAL AWARD (Florida Library Association): Margaret Mitchell, *Gone with the Wind*. DODD, MEAD, AND REDBOOK (\$10,000): Elizabeth Seifert, *Young Doctor Galahad*. JULIA ELLSWORTH FORD FOUNDATION CHILDREN'S BOOK CONTEST (\$3,000): Phyllis Crawford, *Hello, the Boat*. GUGGENHEIM FELLOWSHIPS: Arthur Arent, Josef Berger, Richard Palmer Blackmer, Oscar Brynes, Mrs. Mary Colum, August William Derleth, Clifford Shirley Dowdey, Jr., Joseph Leon Edel, Rolfe Humphries, William Alexander Jackson, Carlyle Ferren MacIntyre, Lewis Mumford, Katherine Anne Porter, Allen Walker Read, Frederick Millet Salter. HARPER'S MAGAZINE CONTEST ON *The American Way* (\$1,000): David Cushman Coyle, *The American Way*. HOUGHTON MIFFLIN LITERARY FELLOWSHIPS (\$1,000 in addition to royalties and advances): Maurine Whipple. LIMITED EDITIONS CLUB GOLD MEDAL: Van Wyck Brooks, *The Flowering of New England*. LOUBAT PRIZES (Columbia University): First Prize (\$1,000): Samuel Eliot Morison, *Tercentennial History of Harvard*. Second prize (\$400): Samuel Kirkland Lothrop, *Cocle: an Archaeological Study of Central Panama*. NATIONAL BOOK AWARDS FOR 1937 (American Booksellers Association): A. J. Cronin, *The Citadel*; Eve Curie, *Madame Curie*; Lawrence Watkin, *On Borrowed Time*; Carl Crow, *400,000,000 Customers*. JOHN NEWBERY MEDAL (most

distinguished children's book, American Library Association): Kate Seredy, *The White Stag*. CARDINAL NEWMAN AWARD (Newman Foundation): Thomas Mann. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL CONTEST (\$250 each): J. R. R. Tolkien, *The Hobbit*; John R. Tunis, *Iron Duke*. O. HENRY MEMORIAL AWARDS (best short stories): first prize (\$300), Albert Maltz, *The Happiest Man on Earth*; second prize (\$200), Richard Wright, *Fire and Cloud*; third prize (\$100), John Steinbeck, *The Promise*. POETRY (magazine) PRIZES: Anne Channing, Hilda Doolittle, H. H. Lewis, Willard Mass, D. S. Savage, Dylan Thomas, Belle Turnbull. PULITZER PRIZES (\$1,000 in each class): fiction, John P. Marquand, *The Late George Apley*; drama, Thornton Wilder, *Our Town*; history, Paul A. Buck, *The Road to Reunion*; biography, Odell Shepard, *Pedlar's Progress*, and Marquis James, *The Border Captain*, and *Portrait of a President*; poetry, Marya Zaturenska, *Cold Morning Sky*. SHELLEY MEMORIAL AWARD (Poetry Society of America): Lincoln Fittell. STORY MAGAZINE CONTEST for men and women on the Federal Writers Project (\$500): Richard Wright, *Uncle Tom's Children*. WILLIAMS AND WILKINS' SCIENCE CONTEST (\$1,000): Margaret Shea Gilbert, *Biography of the Unborn*. YALE SERIES OF YOUNGER POETS: Joy Davidman, *Letter to a Comrade*.

1939.—ALL-NATIONS PRIZE NOVEL COMPETITION, AMERICAN SECTION (\$1,000): John Selby, *Sam*. ATLANTIC NON-FICTION PRIZE (\$5,000): Agnes Keith, *Land Below the Wind*. COMMONWEALTH CLUB OF CALIFORNIA AWARDS TO CALIFORNIA AUTHORS, Gold medals: George R. Stewart, *East of the Giants* and Herbert Ingram Priestley, *France Overseas*. Silver medals: Oscar Lewis, *Big Four*, Edward Alexander Powell, *Gone Are the Days*, and Dana Lamb (joint author with June Cleveland), *Enchanted Vagabonds*. DUKE UNIVERSITY PRESS PRIZE (\$1,500): Clement Eaton, *Freedom of Thought in the Old South*. JULIA ELLSWORTH FORD FOUNDATION CHILDREN'S BOOK CONTEST (\$2,000): Elinore Blaisdell, *Falcon*, *Fly Back*. FRIENDS OF AMERICAN WRITERS' PRIZE TO A MIDWESTERN AUTHOR (\$1,000): Herbert Krause, *Wind Without Rain*. GUGGENHEIM FELLOWSHIPS (c. \$2,500 each): Oscar Fritiof Ander, Herschel Brickell, Oscar Brynes, William S. Clark, Robert Donaldson Darrell, John Dos Passos, Elmer Ellis, Kenneth Fearing, Wallace K. Ferguson, Ernest C. Mossner, Herbert J. Muller, Charles John Olson, Gaines Post, Fannie Elizabeth Ratchford, Harold A. Sinclair, Robert Penn Warren, Arthur M. Wilson, Edmund Wilson, Howard Wolf, Richard Wright, Carl Zigrosser. HARPER NOVEL PRIZE (\$7,500): Vardis Fisher, *Children of God*. HOUGHTON MIFFLIN LITERARY FELLOWSHIPS (\$1,000 in addition to royalties and advances): Mary King, Helen Todd. NATIONAL BOOK AWARDS FOR 1938 (American Booksellers Association): David Fairchild, *The World Was My Garden*; Margaret Halsey, *With Malice Toward Some*; Daphne du Maurier, *Rebecca*; Anne Morrow Lindbergh, *Listen! the Wind*. JOHN NEWBERY MEDAL (most distinguished children's book, American Library Association): Elizabeth Enright, *Thimble Summer*. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL CONTEST (\$250 each): Alice M. Coats, *The Story of Horace*, and Phil Stong, *The Hired Man's Elephant*. O. HENRY MEMORIAL AWARDS (best short stories): first prize (\$300), William Faulkner, *Barn Burning*; second prize (\$200), James Still, *Bat Flight*; third prize (\$100), David Cornel De Jong, *Calves*. POETRY (magazine) PRIZES (\$100 each): Maxwell Bodenheim, John Malcolm Brinnin, Malcolm Cowley, E. E. Cummings, H. B. Mallalieu, Stephen Spender. PULITZER PRIZES (\$1,000 in each class): fiction, Marjorie Kinnan Rawlings, *The Yearling*; drama, Robert Sherwood, *Abe Lincoln in Illinois*; history, Frank Luther Mott, *A History of American Magazines*; biography, Carl Van Doren, *Benjamin Franklin*; poetry, John Gould Fletcher, *Collected Poems*. MARY ROBERTS RINEHART MYSTERY NOVEL PRIZE CONTEST (\$1,000): Clarissa Fairchild Cushman, *I Wanted to Murder*. JAMES TERRY WHITE MEDAL (American Library Association): Louis Round Wilson, *A Geography of Reading*. JOHN ANISFIELD AWARD (\$1,000): Charles S. Johnson, *The Negro College Graduate*. DODD, MEAD DETECTIVE STORY (\$10,000): Hugh Pentecost, *Cancelled in Red*. HOPWOOD PRIZES (University of Michigan): poetry, John Anthony Ciardi, *Homeward to America*; fiction, Iola Fuller, *The Loon Feather*. SOUTHERN AUTHORS' AWARD: Ben Lucian Berman, *Blow For a Landing*.

1940.—AMERICAN CIVIL LIBERTIES UNION (\$50 each in addition to royalties): Philo Higley, *First Freedom*; Noel Houston, *According to Law*. AMERICAN HISTORICAL ASSOCIATION PRIZES: GEORGE LOUIS BEER PRIZE (\$240), Richard Heathcote Heindel, *American Impact on Great Britain, 1898-1914*; HERBERT BAXTER ADAMS PRIZE (\$200), John Shelton Curtiss, *Church and State in Russia*; JOHN H. DUNNING PRIZE (\$100), Richard William Leopold, *Robert Dale Owen*. AMERICAN TRACT SOCIETY PRIZE BOOKS: First prize (\$1,000), Samuel Marinus Zwemer, *The Glory of the Manger*; second prize (\$500), Clarence E. N.

Macartney, *Christian Faith and the Spirit of the Age*; third prize (\$250), Wick Broomal, *The Holy Spirit*. JOHN ANISFIELD AWARD (\$1,000): E. Franklin Frazier, *The Negro Family in the United States*. ATLANTIC NOVEL PRIZE (\$10,000): Nina Fedorova (Mrs. Antonia Riasanovsky), *The Family*. CARL M. BOHNERBERGER MEMORIAL MEDAL (Southeastern Library association), Harry Lee, *Fox in the Cloak*. BROSS FIFTIETH ANNIVERSARY PRIZE (\$15,000, Bross fund, Lake Forest university): Harris Franklin Rall, *Christianity*. COMMONWEALTH CLUB OF CALIFORNIA AWARDS TO CALIFORNIA AUTHORS: Gold medals: John Steinbeck, *Grapes of Wrath*, and Franklin Walker, *San Francisco's Literary Frontier*. Silver medals: Agnes Newton Keith, *Land Below the Wind*; Robin Lampson, *Death Loses a Pair of Wings*; Donald Culross Peattie, *Flowering Earth*; Mary Virginia Provines, *Bright Heritage*; William Saroyan, *The Time of Your Life*. DIAL PRESS AWARD FOR TEACHERS (\$1,000): Sophia Belzer Engstrand, *Miss Munday*. DOCK STREET THEATRE'S (Charleston, S.C.) NATIONAL PLAYWRITING AWARD (c. \$200): Albert Carriere, *Danbury Fair*. DODD, MEAD-REDBOOK PRIZE NOVEL (\$10,000): Harlow Estes, *Hildreth*. DODD, MEAD RED BADGE DETECTIVE STORY: David Keith, *A Matter of Iodine*. JULIA ELLSWORTH FORD FOUNDATION CHILDREN'S BOOK CONTEST (\$2,000): Lucy Embury, *The Listening Man*. FRIENDS OF AMERICAN WRITERS' MIDWESTERN PRIZE (\$1,000): Elgin Earl Grosedclose, *Ararat*. GUGGENHEIM FELLOWSHIPS (c. \$2,400 each): Herman J. Broch, Ward Allison Dorrance, John Dos Passos, Lloyd Frankenberg, Lewis Galantieri, Alfred Kazin, Edwin M. Lanham, Andrew Nelson Lytle, Delmore Schwartz, Christine Weston, Howard Wolf. SIDNEY HOWARD AWARD (Playwrights' company): Robert Ardrey. HOWELLS MEDAL FOR FICTION (American Academy of Arts and Letters): Ellen Glasgow. ALFRED A. KNOPF FELLOWSHIPS (\$1,200 each): Wallace M. Kelly, Wheaton J. Lane, Henry Ladd Smith. LEAGUE OF AMERICAN WRITERS FELLOWSHIPS TO EXILED WRITERS (\$100 each): Oskar Maria Graf, Will Schaber, Bodo Uhse. ROI COOPER MEGRUE PRIZE (\$500, Dramatists' guild): Howard Lindsay and Russel Crouse, *Clarence Day's Life with Father Made into a Play*. NATIONAL BOOK AWARDS FOR 1939 (American Booksellers association): Elgin Earl Grosedclose, *Ararat*; Antoine de Saint Exupéry, *Wind, Sand and Stars*; Dalton Trumbo, *Johnny Got His Gun*; John Steinbeck, *Grapes of Wrath*. NATIONAL INSTITUTE OF ARTS AND LETTERS GOLD MEDAL: Robert Emmet Sherwood. NATIONAL POETRY CENTER MEDAL OF HONOR: Jessie Belle Rittenhouse, *Moving Tide*. JOHN NEWBERRY MEDAL (most distinguished children's book, American Library association): James Daugherty, *Daniel Boone*. NEW YORK DRAMA CRITICS' AWARD: William Saroyan, *The Time of Your Life*. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL CONTEST (\$250 each): Lucy Herndon Crockett, *That Mario*, and James Douglas Adams, *Cap'n Ezra, Privateer*. O. HENRY MEMORIAL AWARDS (best short stories): first prize (\$300), Stephen Vincent Benét, *Freedom's a Hard-bought Thing*; second prize (\$200), Roderick Lull, *Don't Get Me Wrong*; third prize (\$100), Edward Havill, *The Kill*. PARENTS' MAGAZINE MEDAL: Mrs. Sidonie Matsner Gruenberg, *We, the Parents*. POETRY (magazine) PRIZES (\$100 each): Jeannette Sewell Davis, Kenneth Fearing, Robinson Jeffers, Louis MacNeill, Muriel Rukeyser, David Wolff. POETRY SOCIETY OF AMERICA: medal, Padraic Colum; first prize (\$100), Helen Morrow, *Marcus Aurelius in Bohemia*; second prize (\$50), Harold Vinal, *Impossible Rendezvous*. PULITZER PRIZES (\$1,000 in each class): fiction, John Steinbeck, *Grapes of Wrath*; drama, William Saroyan, *The Time of Your Life*; history, Carl Sandburg, *Abraham Lincoln: the War Years*; biography, Ray Stannard Baker, *Woodrow Wilson: Life and Letters*, vols. vii and viii; poetry, Mark van Doren, *Collected Poems*. SOCIETY FOR THE LIBRARIES AT NEW YORK UNIVERSITY GOLD MEDAL: Katherine Anne Porter, *Pale Horse, Pale Rider*. SOUTHERN AUTHOR'S AWARD (\$100, Southern Women's National Democratic organization): Hamilton Basso, *Days Before Lent*. TEXAS INSTITUTE OF LETTERS SILVER MEDAL: Dora Neill Raymond, *Captain Lee Hall of Texas*. YALE SERIES OF YOUNGER POETS: Norman Rosten, *Return Again, Traveler*. YOUNG PEOPLE'S CHOICE AWARD (Pacific Northwest Library association): Dell J. McCormick, *Paul Bunyan Swings his Axe*.

1941.—AMES PRIZE (Harvard Law school): Professor James C. Bonbright of Columbia university and Professor Isaiah L. Sharfman of the University of Michigan for distinguished writing in the legal field. JOHN ANISFIELD AWARD (\$1,000 for the outstanding book on race relations): (*Saturday Review of Literature*) Louis Adamic, *From Many Lands* (Harper). ATLANTIC MONTHLY PRESS NON-FICTION PRIZE (\$3,000 and royalties): Edith M. Almedingen for her autobiography *Tomorrow Will Come*. ATLANTIC MONTHLY SHORT STORY PRIZE (\$1,000 for the best short story by writers in their 20s): John D. Weaver, *Clouds of Glory*. GEORGE LOUIS BEER PRIZE (American Historical association) (\$240): Richard H. Heindel, *The American Impact on*

Great Britain, 1898-1914. BROSS PRIZE (Lake Forest college, Ill.) (\$15,000): Harris Franklin Rall, *Christianity: An Inquiry into Its Nature and Truth*. CATHOLIC LITERARY AWARD (Gallery of Living Catholic Authors, Webster Groves, Mo.) (an honorary scroll): Eric Gill, *Autobiography*. CHICAGO FOUNDATION FOR LITERATURE: Professor Percy Holmes Boynton of the University of Chicago for distinguished service to literature. COMMONWEALTH CLUB OF CALIFORNIA.—GOLD MEDAL GENERAL LITERATURE PRIZE: Stewart Edward White, *Wild Geese Calling*. GOLD MEDAL SCHOLARSHIP PRIZE: Carl Thurston, *The Structure of Art*. SILVER MEDALS: Kenneth Rexroth, *In What Hour*; Doris Gates, *Blue Willow*; Harold Lamb, *The March of the Barbarians*; William Saroyan, *My Name is Aram*; Thomas A. Bailey, *A Diplomatic History of the American People*. DODD, MEAD PRIZES, THE INTER-COLLEGIATE LITERARY FELLOWSHIP: Maureen Daly, *Seventeenth Summer*; RED BADGE DETECTIVE PRIZE, Susannah Shane, *Lady in Lilac*; Eleanore Kelly Sellars, *Murder à la Mode*. WESTERN STORY NOVEL PRIZE: Peter Dawson, *The Crimson Horseshoe*. FRIENDS OF AMERICAN WRITERS AWARD (\$1,000 to promote high standards and ideals in American writing): Marcus Goodrich, *Delilah*. GREYSTONE BOOKMAN'S PRIZE: Albert Idell, *Pug*. HARPER NOVEL PRIZE (\$10,000): Judith Kelly, *Marriage Is a Private Affair*. O. HENRY MEMORIAL AWARDS: first prize (\$300), Kay Boyle, *Defeat*; second prize (\$200), Eudora Welty, *A Worn Path*; third prize (\$100), Hallie Southgate Abbott, *Eighteenth Summer*; a special prize (\$100) for first published short story, Andy Logan, *The Visit*. AVERY AND JULE HOPWOOD AWARDS (University of Michigan): Beatrice Borst, *Nearer the Earth*. HOUGHTON MIFFLIN LIFE IN AMERICA AWARDS: Agnes Morley Cleveland, *No Life For a Lady*; and Donald Culross Peattie, *The Road of a Naturalist*. THOMAS JEFFERSON SOUTHERN AWARDS: Elizabeth Lee Wheaton, *Mr. George's Joint*; silver medal to Eloise Liddon, *Some Lose Their Way*. ALFRED A. KNOPF LITERARY FELLOWSHIPS: Berenice D. Thorpe, W. E. Binkley, Mitchell V. Charnley. LATIN AMERICAN PRIZE (\$2,500): Ciro Alegria, *Broad and Alien is the World*. LIMITED EDITIONS CLUB GOLD MEDAL: Ernest Hemingway, *For Whom the Bell Tolls*. NATIONAL BOOK AWARDS (American Booksellers Association): Richard Llewellyn, *How Green Was My Valley*, Hans Zinsser, *As I Remember Him*, Perry Burgess, *Who Walk Alone*. NEW YORK DRAMA CRITICS' AWARD: Lillian Hellman, *Watch On the Rhine*, Emlyn Williams, *The Corn Is Green*. NEW YORK UNIVERSITY SOCIETY FOR LIBRARIES GOLD MEDAL: Perry Burgess, *Who Walk Alone*. PARENTS' MAGAZINE MEDALS: Florence Powdermaker and Louise Ireland Grimes, *Children In The Family*; Lois Hayden Meek, *Your Child's Development and Guidance, Told in Pictures*. PULITZER PRIZES: novel, no award; drama, Robert E. Sherwood, *There Shall Be No Night*; history, Marcus Lee Hansen, *The Atlantic Migration*; biography, Ola Elizabeth Winslow, *Jonathan Edwards*; poetry, Leonard Bacon, *Sunderland Capture*. POETRY (magazine) AWARDS (\$100 each): Archibald MacLeish, Paul Engle, Stanley J. Kunitz, Karl J. Shapiro, A. J. M. Smith, Frederic Prokosch. REYNAL AND HITCHCOCK NON-FICTION PRIZE (\$2,500): W. T. Stace, *The Destiny of Western Man*. MARY ROBERTS RINEHART MYSTERY NOVEL PRIZE: A. R. Hilliard, *Justice Be Damned*. SATURDAY REVIEW OF LITERATURE AWARD FOR DISTINGUISHED SERVICE TO AMERICAN LETTERS: Ellen Glasgow. CONSTANCE LINDSAY SKINNER MEDAL (Women's National Book association): Blair Niles. TEXAS INSTITUTE OF LETTERS BOOK AWARD: George Sessions Perry, *Hold Autumn in Your Hand*. YALE SERIES OF YOUNGER POETS: Jeremy Ingalls, *The Metaphysical Sword*. THE CALDECOTT MEDAL FOR THE MOST DISTINGUISHED AMERICAN PICTURE BOOK FOR CHILDREN: Robert Lawson, *They Were Strong and Good*. JULIA ELLSWORTH FORD FOUNDATION AWARD (\$2,000): Babette Deutsch, *Walt Whitman, Builder for America*. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK CONTEST (\$250 each): Ann Nolan Clark, *In My Mother's House*; Mildred Mastin Pace, *Clara Barton*; Tom Robinson, *Pete*. JOHN NEWBERRY MEDAL (American Library association): Armstrong Sperry, *Call it Courage*.

1942.—AMERICAN ACADEMY OF ARTS AND LETTERS AND THE NATIONAL INSTITUTE OF ARTS AND LETTERS, AWARDS IN LITERATURE (\$1,000 each): Norman Corwin, Edgar Lee Masters, Muriel Rukeyser and Hermann Broch. JOHN ANISFIELD AWARDS (*Saturday Review of Literature*, \$1,000 each): Leopold Infeld, *Quest*; James G. Leyburn, *The Haitian People*. ATLANTIC MONTHLY PRESS NOVEL CONTEST (\$10,000): no award made. CHICAGO FOUNDATION FOR LITERATURE AWARDS: Vincent Starrett, *Books Alive*; Dr. Preston Bradley "for distinguished service to literature"; Rachel Albright for poetry. COMMONWEALTH CLUB OF CALIFORNIA, GOLD MEDAL FOR GENERAL LITERATURE: Joseph

Henry Jackson, *Anybody's Gold*; GOLD MEDAL FOR SCHOLARSHIP AND RESEARCH, Lesley Byrd Simpson, *Many Mexicos*; SILVER MEDALS, Richard T. LePiere, *When the Living Strive*; John W. Dodds, *Thackeray*; Frank J. Kleinberg, *The Morning of America*. DIAL PRESS AWARD (\$1,000 and royalties): Gladys Schmitt, *The Gates of Aulis*. DODD, MEAD-REDBOOK MAGAZINE FICTION PRIZE (\$10,000): Ellen Proctor, *Turning Leaves*; DODD, MEAD RED BADGE DETECTIVE STORY PRIZE: James Wellard, *The Snake in the Grass*; INTERCOLLEGIATE FELLOWSHIP AWARD (\$1,200): Barbara Bentley, *A Hedge Against the Sun*. FRIENDS OF AMERICA WRITERS' AWARD (\$1,000): Paul Engle, *West of Midnight*. GUGGENHEIM FELLOWSHIPS (about \$2,500 each): George Zabrishie, Wystan Hugh Auden, Carson McCullers, Eudora Welty, Dorothy Baker, John Dos Passos, Gustavus Myers, Dixon Wecter, Mark Schorer, Justin O'Brien, Gordon Norton Ray. GUGGENHEIM FELLOWSHIPS TO LATIN AMERICAN SCHOLARS (about \$2,000 each): Gabriel Fernández Ledesma, Professor Arturo Arnaiz y Freg, Professor Antonio Hernández Travieso, Wigberto Jiménez Moreno. HARPER 125TH ANNIVERSARY AWARD (\$12,500): Prize divided between Julian Green, *Memories of Happy Days* and John Andrew Rice, *I Came Out of the Eighteenth Century*. O. HENRY MEMORIAL AWARD PRIZE STORIES: first prize (\$300) Eudora Welty, *The Wide Net*; second prize (\$200) Wallace Stegner, *Two Rivers*; third prize (\$100) William L. Schramm, *Windwagon Smith*; a special prize (\$100) for the first published short story, Jeanne E. Wylie, *A Long Way to Go*. AVERY AND JULE HOPWOOD AWARDS (\$750 divided among three students): Raymond Early, *Mightier Than the Sword*; Rosemary Obermeyer, *Golden Apples of the Sun*; Jay McCormick, *November Storm*; \$500 poetry prize, Robert E. Hayden, *The Black Spear*; drama prize, Jack Mitchell, *Brita*; essay award, Laia Hanau, Lois Helene Van der Meulen, Celia Hwaguen Chao and G. Nelson Bentley. HOUGHTON MIFFLIN LIFE-IN-AMERICA SERIES AWARDS (\$2,500 each): Sam Byrd, *Small Town South*; Dr. Frederick Carpenter Irving, *Safe Deliverance*. HOUGHTON MIFFLIN LITERARY FELLOWSHIP (\$1,500): Donald MacRae. ALFRED A. KNOPF LITERARY FELLOWSHIPS (\$1,200): Robert Faucett Gibbons, Dr. Angie Debo, Russel Blaine Nye. LAETARE MEDAL: Helen Constance White. J. B. LIPPINCOTT PRIZE (\$1,000 to a University of Alabama student): Arthur Phillips, *Victory In The Dust*. RUSSELL LOINES MEMORIAL FUND POETRY AWARD (\$1,000): Horace Gregory. NATIONAL BOOK AWARD (American Booksellers Association): George Sessions Perry, *Hold Autumn In Your Hand*. NEW DIRECTIONS PRESS (*Direction Magazine*) SERVICE MEN'S WRITING CONTEST: first prize (\$100) Herbert Avedon, *Michael*; second prize (\$50) Martin Savela, *Man In Uniform*. NEW YORK UNIVERSITY SOCIETY FOR LIBRARIES GOLD MEDAL: Conrad Richter, *The Sea of Grass* and *The Trees*. OHIOANA LIBRARY AWARD: James B. Reston, *Prelude To Victory*. PACIFIC NORTHWEST LIBRARY ASSOCIATION, CHILDREN'S SECTION: Laura Ingalls Wilder, *By the Shores of Silver Lake*. PARENTS' MAGAZINE AWARD: Anna W. M. Wolf, *The Parents' Manual*. POOR RICHARD CLUB OF PHILADELPHIA: Pearl Buck. POETRY (magazine) AWARDS: (\$100 each): Karl Jay Shapiro, St. Jean Perse, John Frederick Nims, E. L. Mayo, Katinka Loeser. PULITZER PRIZES: novel, Ellen Glasgow, *In This Our Life*; drama, no award; history, Margaret Leech, *Reveille In Washington*; biography, Forrest Wilson, *Crusader in Crinoline*; poetry, William Rose Benét, *The Dust Which Is God*. ROOSEVELT DISTINGUISHED SERVICE MEDALS: Booth Tarkington, Dr. Rufus Matthew Jones, Henry Lewis Stimson. CONSTANCE LINDSAY SKINNER MEDAL: Irita Van Doren. SOUTHERN WOMEN'S NATIONAL DEMOCRATIC COMMITTEE AWARD (\$100): Ellen Glasgow, *In This Our Life*. YALE SERIES OF YOUNGER POETS: Margaret Walker, *For My People*. CHILDREN'S BOOKS.—CALDECOTT MEDAL FOR A PICTURE BOOK to Robert McCloskey for *Make Way For Ducklings*. JULIA ELLSWORTH FORD FOUNDATION AWARD (\$2,000): Isabel McLennan McMeekin, *Journey Cake*. HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL COMPETITION (three awards of \$200 each): Peter Wells, *Mr. Toot-whistle's Invention*; Commander Edward Ellsberg, *I Have Just Begun To Fight: The Story of John Paul Jones*; Rosamund Van der Zee Marshall, *None But the Brave*. JOHN NEWBURY MEDAL: Walter Dumaux Edmonds, *The Matchlock Gun*.

1943.—AMERICAN ACADEMY OF ARTS AND LETTERS AND THE NATIONAL INSTITUTE OF ARTS AND LETTERS (\$1,000 each): Carson McCullers, José García Villa, Virgil Geddes and Joseph Wittlin. JOHN ANISFIELD AWARDS (*Saturday Review of Literature*, \$1,000 each): Zora Neale Hurston, *Dust Tracks on a Road*; Donald Pierson, *Negroes in Brazil*. ATLANTIC MONTHLY PRESS AND LITTLE, BROWN & COMPANY (\$5,000): no prize awarded. A. S. BARNES & CO.: first prize (\$250), John Ackerson;

second prize (\$100), Corporal Harold Applebaum. CAREY-THOMAS AWARD (*Publishers' Weekly*): for the best example of creative publishing, a scroll to Farrar & Rinehart for "Rivers of America" series. CATHOLIC LITERARY AWARD: John Farrow, *Pageant of the Popes*. COMMONWEALTH CLUB OF CALIFORNIA: GOLD MEDALS: Oscar Lewis, *I Remember Christine*; James Westfall Thompson and Bernard J. Holm, *The History of Historical Writing*; Silver medals: H. L. Davis, *Proud Riders*; Hildegard Hawthorne, *Long Adventure*; Hector Chevigny, *Lord of Alaska*; Frank Waters, *The Man Who Killed the Deer*; Lillian B. Ross, *The Stranger*. DOUBLEDAY, DORAN—CURTIS BROWN WRITERS' CONFERENCE PRIZE (\$400): Joyce Horner, *The Wind and the Rain*. DODD, MEAD RED BADGE DETECTIVE STORY PRIZE (\$1,000 each): Ruth Sawtell Wallis, *Too Many Bones*; John Lodwick, *Running to Paradise*; Catherine Lawrence, *One of the Masses*. E. P. DUTTON & COMPANY, THOMAS JEFFERSON SOUTHERN AWARD (\$2,500): Jesse Stuart, *Taps For Private Tussie*. LEWIS AND CLARK NORTHWEST CONTEST (\$1,500): Clyde F. Murphy, *The Glittering Hill*. FRIENDS OF AMERICAN WRITERS AWARD (\$750): Kenneth L. Davis, *In the Forests of the Night*. GUGGENHEIM FELLOWSHIPS (about \$2,500 each): Muriel Rukeyser, Edward Weismiller, Jeremy Ingalls, José García Villa, Vladimir Nabokov, Vladimir Pozner, Dr. Hugh MacLennan, Signe Kirstine, Dr. David Willson, Madeleine Stern, Dr. Randall Stewart, Dr. William Charvat, Dr. John Flanagan, Dr. Harry Levin. HARPER PRIZE NOVEL AWARD (\$10,000): Martin Flavin, *Journey in the Dark*. HARPER'S MAGAZINE PRIZE (\$1,000): Bob Fairhaul and his collaborator, Richard G. Hubler, *The Bomb Hit the Cruiser*. O. HENRY MEMORIAL AWARDS: first prize (\$300), Eudora Welty, *Liuvie Is Back*; second prize (\$200), Dorothy Canfield, *The Knot Hole*; third prize (\$100), William Fifield, *The Fishermen of Palzcuaro*; a first story prize (\$100), Clara Laidlaw, *The Little Black Boys*. AVERY HOPWOOD AWARD: Jay McCormick, *November Storm*. HOUGHTON, MIFFLIN LIFE-IN-AMERICA SERIES AWARD (\$2,500): Roi Ottley, *New World A-Coming*; *Inside Black America*. ALFRED A. KNOPF LITERARY FELLOWSHIPS (\$2,500 each): Mrs. Fawn Brodie and Donald W. Mitchell. LATIN-AMERICAN LITERARY PRIZE (\$2,000 each): Pierre Marcelin and Philippe Thoby-Marcelin (Haiti) *Canapé-Vert*; Argentina Diaz Lozano (Honduras), *Peregrinaje*; (\$1,000) Fernando Alegria (Chile), *Lautaro*. NATIONAL EDUCATION ASSOCIATION JOURNAL: Herbert Agar, *A Time of Greatness*. NEW YORK DRAMA CRITICS CIRCLE AWARD; Sergeant Sidney Kingsley, *The Patriots*. NEW YORK HISTORICAL SOCIETY: Dr. George C. D. Odell, *Annals of the New York Stage*. PARENTS MAGAZINE AWARDS: Anna W. M. Wolf, *Our Children Face War*; Dorothy W. Baruch, *You, Your Children and War*. PULITZER PRIZES: novel, Upton Sinclair, *Dragon's Teeth*; drama, Thornton Wilder, *The Skin of our Teeth*; history, Esther Forbes, *Paul Revere and the World He Lived In*; biography, Samuel Eliot Morison, *Christopher Columbus; Admiral of the Ocean Sea*; poetry, Robert Frost, *A Witness Tree*. MARY ROBERTS RINEHART MYSTERY NOVEL AWARD (\$2,000): C. W. Grafton, *The Rat Began to Gnaw the Rope*. SHELLEY MEMORIAL AWARD: Percy MacKaye and Robert Penn Warren, jointly. CONSTANCE LINDSAY SKINNER AWARD: Mary Graham Bonner, *Canada and Her Story*. SOUTHERN WOMEN'S NATIONAL DEMOCRATIC ORGANIZATION IN NEW YORK: Douglas Southall Freeman, *Lee's Lieutenants*. UNIVERSITY OF MINNESOTA FELLOWSHIPS: Vera Kelsey, Meridel Le Sueur, Florence and Francis Lee Jacques. *Children's Books*.—CALDECOTT MEDAL FOR A PICTURE BOOK: Virginia Lee Burton, *The Little House*. DOWNEY AWARD: Covelle Newcomb, *The Red Hat*. JULIA ELLSWORTH FORD FOUNDATION AWARD (\$1,250): Gladys Malvern, *Valiant Minstrel: The Story of Harry Lauder*. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL PRIZES (\$200 each): Hugh Troy, *Five Golden Wrens*; Laura Ingalls Wilder, *These Happy Golden Years*; Elizabeth Yates, *Patterns On The Wall*. JUNIOR SCHOLASTIC MAGAZINE GOLD SEAL: Gregor Felsen, *Submarine Sailor*. JOHN NEWBURY MEDAL: Elizabeth Janet Gray, *Adam of the Road*. YOUNG READER'S CHOICE AWARD: Eric Knight, *Lassie Come-Home*.

1944.—AMERICAN ACADEMY OF ARTS AND LETTERS (award of merit and \$1,000): Theodore Dreiser. NATIONAL INSTITUTE OF ARTS AND LETTERS, GOLD MEDAL: Willa Cather. ABINGDON-COKESBURY AWARD: Dr. Stanley R. Hopper, *The Crisis of Faith*. JOHN ANISFIELD AWARDS (*Saturday Review of Literature*): first prize (\$1,500) Maurice Samuel, *The World of Sholom Aleichem*; second prize (\$500) Roi Ottley, *New World A-Coming*. ARMED FORCES SERVICE LEAGUE: *Fighting Words* edited by Warfield Lewis (Lippincott), 25 stories and 28 cartoons by members of the Armed Forces of America. Profits to go to the Armed Forces Service league. BRUCE PUBLISHING COMPANY AND EXTENSION MAGAZINE (\$500 and serialization at the rate of \$100 an instalment): Edward F. Murphy, *The Scarlet Lily*. CAMOES

PRIZE: Elaine Sanceau, *The Land of Prester John*. CAREY THOMAS AWARD (for the best example of creative publishing) University of Chicago Press, *A Dictionary of American English*. COMMONWEALTH CLUB OF CALIFORNIA awards to California authors: Gold Medals: Dorothy Baker, *Trio*; Frank Munk, *The Legacy of Nazim*. SILVER MEDALS: Upton Sinclair, *Wide Is The Gate*; Max Radin, *The Day of Reckoning*; Carey McWilliams, *Brothers Under the Skin*; Katherine Wigmore Eyre, *Spurs for Antonia*; SPECIAL AWARD OF DISTINGUISHED MERIT: Albert Guerard, *Napoleon III*. DODD, MEAD RED BADGE DETECTIVE STORY PRIZE (\$1,000): Lawrence Lariat, *The Man With the Lumpy Nose*; FOURTH INTERCOLLEGIATE LITERARY FELLOWSHIP: Mary Vardoulakis. DODD, MEAD-REDBOOK FICTION PRIZE (\$10,000): Dorothea Cornwell, *They Dare Not Go A-Hunting*. DOUBLEDAY, DORAN-KENYON REVIEW SHORT STORY PRIZES: first prize (\$500), Jean Garrigue, *The Snowfall*; second prize (\$250), Frances Gray Patton, *A Piece of Bread*. FRIENDS OF AMERICAN WRITERS AWARDS (\$500 in cash and \$250 in war bonds) Paul Hughes, *Retreat From Rostov*. JOHN GOLDEN DRAMA PRIZE: first prize (\$500), David K. Dempsey, *It Ain't Brooklyn*; second prize (\$250), A. A. O'Keefe, *Slip Ahoy*; third prize (\$125), Leo F. Curley and Murray Schumach, *A Wall Is a Bulkhead*. GUGGENHEIM FELLOWSHIPS: Howard Baker, Henrietta Buckmaster, Marie Campbell, J. Saunders Redding, Karl Shapiro, Hugh Mason Wade, Morton Zabel. O. HENRY MEMORIAL AWARD: first prize (\$300), Irwin Shaw, *Walking Wounded*; second prize (\$200), Bessie Breuer, *Home Is A Place*; third prize (\$100), Griffith Beems, *The Stagecoach*; special prize for first short story published (\$100), Frank Yerby, *Health Card*. AVERY HOPWOOD POETRY AWARD: Rosamund Haas, *Delay Is the Song*. HOUGHTON, MIFFLIN LIFE-IN-AMERICA SERIES AWARD (\$2,500): Dixon Wecter, *When Johnny Comes Marching Home*; LITERARY FELLOWSHIPS (\$1,500 each): Edward Kimbrough and Joseph Wechsberg. ALFRED A. KNOPF LITERARY FELLOWSHIPS (about \$2,500 each): Stearns Morse, *The Yankee Spirit*; Edward T. Booth. LATIN-AMERICAN LITERARY PRIZE: Cecilio J. Carneiro, *The Bonfire*. METRO-GOLDWYN-MAYER FIRST ANNUAL AWARD (\$125,000 plus royalties for motion picture and allied rights to an unpublished novel which a book publisher has contracted to publish in the United States) Elizabeth Goudge, *Green Dolphin Street*. N.Y. DRAMA CRITICS CIRCLE AWARD: no play found worthy of award. OHIOANA MEDAL: Fred C. Kelly, *The Wright Brothers*. PARENTS' MAGAZINE 18TH ANNUAL AWARDS: Arnold Gesell and Frances L. Ilg, *Infant and Child in the Culture of Today*; Dorothy Canfield Fisher, *Our Young Folks*. PULITZER PRIZES: novel, Martin Flavin, *Journey in the Dark*; drama, no award, but special award to Richard Rodgers and Oscar Hammerstein II for *Oklahoma!*; history, Merle Curti, *The Growth of American Thought*; biography, Carlton Mabie, *The American Leonardo: the Life of Samuel F. B. Morse*; poetry, Stephen Vincent Benet, *Western Star*. SATURDAY REVIEW OF LITERATURE AWARD: for distinguished service to U.S. publishing, *Yank*, the army weekly. SHELLEY MEMORIAL AWARD: Edgar Lee Masters. CONSTANCE LINDSAY SKINNER AWARD: Mildred C. Smith. SOUTHERN WOMEN'S NATIONAL DEMOCRATIC ORGANIZATION IN NEW YORK (\$100): Robert Douthat Meade, *Judah P. Benjamin, Confederate Statesman*. STANFORD UNIVERSITY DRAMATISTS' ALLIANCE, MAXWELL ANDERSON AWARD (\$100): Donald Lawhon Stoffe, *Lead Her Up to Candy*; ETHEREGE AWARD (\$100): Ronald Elwy Mitchell, *The Wives of Saint Joseph*; STEPHEN VINCENT BENET AWARD: Sgt. Edwin Gross, *T M D*. STORY MAGAZINE ANNUAL COLLEGE SHORT STORY CONTEST (\$100 each): James P. Terzian; ARMED FORCES PRIZE: Corporal Don Lawson. UNIVERSITY OF MINNESOTA REGIONAL WRITING FELLOWSHIPS: Skulda V. Baner, John Drury, Feike Feikema, Margaret Ann Hubbard, Philip D. Jordan, Herbert Krause, Meridel Le Seuer (renewal), Clara W. Nelson (renewal), Laurence Schmeckebier, Alma S. Scott, Louis Towley, Thorstina Jackson Walters. YALE SERIES OF YOUNGER POETS: Archibald MacLeish, *Love Letter from an Impossible Land*. CHILDREN'S BOOKS.—CALDECOTT MEDAL: Louis Slobodkin for his illustrations of *Many Moons* by James Thurber. CHILD STUDY ASSOCIATION OF AMERICA, HONORARY AWARD: John R. Tunis, *Keystone Kids*. DOWNEY MEDAL: Alfred Noyes, *The Secret of Pooduck Island*. JULIA ELLSWORTH FORD FOUNDATION (\$1,250): Laura Newbold Wood, *Raymond L. Dittmars: His Exciting Career With Reptiles, Insects and Animals*. JUNIOR SCHOLASTIC GOLD SEALS: Constance Savery, *The Good Ship, Red Lily*; Helena Kuo, *Giants of China*. NEW YORK HERALD TRIBUNE CHILDREN'S SPRING BOOK FESTIVAL (\$200 each): M. Ilin and E. Segal, *A Ring and a Riddle*; Roger Duvoisin, *They Put Out to Sea*; Armstrong Sperry, *Storm Canvas*. JOHN NEWBERY MEDAL: Esther Forbes, *Johnny Tremain*. YOUNG READER'S CHOICE AWARD: Walter Farley, *Black Stallion*.

1945.—AMERICAN ACADEMY OF ARTS AND LETTERS, THE WILLIAM DEAN HOWELLS MEDAL: Booth Tarkington. The poetry

prize (\$1,000) and the medal of the AWARD OF MERIT, W. H. Auden. Six literature awards of \$1,000 each, Kenneth Fearing, Feike Feikema, Norman Rosten, Jean Stafford, Marguerite Young and Alexander Greendale. National Institute Award FOR DISTINGUISHED SERVICE (\$1,000): Dr. Richard Beer-Hoffman. ANISFIELD-WOLF AWARDS: Gwethalyn Graham, *Earth and High Heaven*; Gunnar Myrdal, *An American Dilemma: The Negro Problem and Modern Democracy*. JOHN BURROUGHS ASSOCIATION BRONZE MEDAL: Rutherford Platt, *This Green World*. NICHOLAS MURRAY BUTLER GOLD MEDAL: George Santayana, *Realms of Being*. SILVER MEDAL: Sidney Hook. CAREY-THOMAS AWARD: for creative publishing to E. P. Dutton and Company, Inc. for the works of Van Wyck Brooks. GEORGE WASHINGTON CARVER MEMORIAL AWARD (\$2,500): Fannie Cook, *Mrs. Palmer's Honey*. COMMONWEALTH CLUB OF CALIFORNIA:—Gold Medals: Sally Carrighar, *One Day on Beetle Rock*; Thomas Bailey, *Woodrow Wilson and the Lost Peace*; Silver Medals: Edwin V. Westrate, *Forward Observer*; Donald Hough, *Captain Retread*; Will Durant, *Caesar and Christ*; Kenneth Rexroth, *The Phoenix and the Tortoise*; Howard Pease, *Thunderbolt House*. DODD, MEAD RED BADGE DETECTIVE STORY PRIZE (\$1,000): Elinor Chamberlain, *Appointment in Manila*; INTERCOLLEGIATE LITERARY FELLOWSHIP PRIZES (\$1,200 each): Karon Kehoe, *City In The Sun*; Constance Beresford-Howe, *The Unreasoning Heart*. DOUBLEDAY, DORAN NOVEL PRIZE (\$20,000): Elizabeth Metzger Howard, *Before the Sun Goes Down*; NEW WRITERS CONTEST PRIZE (\$4,000): Charles Andrews Fenton, *But We Had Fun*. JOHN SIMON GUGGENHEIM MEMORIAL FOUNDATION FELLOWSHIPS: Major Hodding Carter, Corporal Stanley J. Kunitz, Jerre Mangione, Lieutenant Commander Laurance Thompson, Marianne Moore, Theodore Roethke, Jean Stafford Lowell, Robert Pick. O. HENRY MEMORIAL AWARD PRIZE STORIES: first prize (\$300), Walter Van Tilburg Clark, *The Wind and the Snow of Winter*; second prize (\$200), Irwin Shaw, *Gunnars' Passage*; third prize (\$100), to Ben Hur Lampman, *Old Bill Bent to Drink*; \$100 for a first-published story, Captain Laurence Critchell, *Flesh and Blood*. AVERY HOPWOOD FICTION AWARDS: William Kehoe, *A Sweep of Dusk*; Rene Kuhn, *34 Charlton*; Fynette Rowe, *The Chapin Sisters*. HOUGHTON MIFFLIN LIFE IN AMERICA AWARD (\$2,500 each): Wallace Stegner and the editors of *Look for One Nation*; Lora Wood Hughes, *No Time For Tears*. HOUGHTON MIFFLIN FELLOWSHIPS (\$1,000): Elizabeth Bishop, *North and South*; (\$2,400) Ann Petry, *The Street*; (\$2,400) Beatrice Griffith, *A Study of Mexicans in the United States*. THOMAS JEFFERSON SOUTHERN AWARD (\$2,500): Ben Lucien Burman, *Rooster Crows For Day*. ALFRED A. KNOPF LITERARY FELLOWSHIPS (\$5,000 each): Dr. Richard Hofstadter for his proposed book, *Men and Ideas in American Politics*; Dr. R. Carlyle Buley to work on his history, *The Old Northwest, 1815-1840*. LEAGUE TO SUPPORT POETRY: Alice Monks Mears, *Brief Enterprise*. LIMITED EDITIONS CLUB GOLD MEDAL: E. B. White, *One Man's Meat*. MACMILLAN CENTENARY AWARDS (\$2,500 each): Sergeant Josiah E. Greene, *Not in Our Stars*; Staff Sergeant Spencer Logan, *Democracy Needs the Negro*. Awards in England of £500 each to Captain George C. Greenfield for his novel *Desert Episode* and to Lieutenant John Davies for *Lower Deck*. Awards of £100 to Sergeant C. R. Livingstone, Major H. Montgomery Hyde and Flying Officer Dobson. METRO-GOLDWYN-MAYER ANNUAL NOVEL AWARD (\$175,000 maximum): Elizabeth Metzger Howard, *Before The Sun Goes Down*. NEW YORK DRAMA CRITICS AWARD: Tennessee Williams, *The Glass Menagerie*. W. W. NORTON AND COMPANY MEDICAL AWARD: Carl A. L. Binger, M.D., *The Doctor's Job* (Norton). PULITZER PRIZES.—Novel, to John Hersey for *A Bell for Adano*; drama, to Mary Chase for *Harvey*; history, to Stephen Bonsal for *Unfinished Business*; biography, to Russel Blaine Nye for *George Bancroft: Brahmin Rebel*; poetry, to Karl Jay Shapiro for *V-Letter and Other Poems*. SATURDAY REVIEW OF LITERATURE AWARD: for distinguished service to American literature, to the Council on Books in Wartime for its *Armed Services Editions*. EUGENE E. SAXTON MEMORIAL FELLOWSHIP: Richard Plant. SHELLEY MEMORIAL AWARD: E. E. Cummings. CONSTANCE LINDSAY SKINNER AWARD: Lillian Smith, *Strange Fruit*. SOUTHERN AUTHOR'S AWARD: Hodding Carter, *The Winds of Fear*. STANFORD UNIVERSITY DRAMATISTS' ALLIANCE, THE STEVENS AWARD: Geneva Harrison, *The Daylight Grows*; ETHEREGE AWARD: Sergeants Malvin Wald and Walter Doniger *Father Was President*; ALDEN AWARD: James Broughton, *Summer Fury*. TWENTIETH CENTURY-FOX FILM CORPORATION FELLOWSHIPS (\$1,500 each): Corporal Len Zinberg, *Golden Time*; Commander W. J. Lederer, *A Thing of Life*; Fletcher Markle, *There Was a Young Man*; Lieutenant Martin A. Dibner, *Jour-*

ney For Jason; Lieutenant E. Shippen Geer, *Overture to War*. **Children's Books.**—CALDECOTT MEDAL: Elizabeth Orton Jones for her illustrations of *Prayer For a Child* by Rachel Field. **DOWNEY MEDAL:** Mairin Cregan, *Rathina*. **JULIA ELLSWORTH FORD FOUNDATION** (\$1,250): Nancy Barnes, *The Wonderful Year*. **JUNIOR SCHOLASTIC GOLD SEALS:** Martha Mann, *Nathan Hale*; Patriot; Cornelia Spencer, *The Land of the Chinese People*. **NEW YORK HERALD TRIBUNE SPRING BOOK FESTIVAL** (\$200 each): Norma Cohn, *Little People in a Big Country*; Ruth Brindze, *Gulf Stream*; Elizabeth Janet Gray, *Sandy*. **JOHN NEWBURY MEDAL:** Robert Lawson, *Rabbit Hill*. **PARENTS' MAGAZINE MEDAL:** George K. Pratt, M.D., *Soldier to Civilian*. **YOUNG READER'S CHOICE AWARD:** Marie McSwigan, *Snow Treasure*.

1946.—ACADEMY OF AMERICAN POETS (\$5,000 fellowship): Edgar Lee Masters; AMERICAN ACADEMY OF ARTS AND LETTERS (\$1,000 each): Gwendolyn Brooks, Kenneth Burke, Malcolm Cowley, Peter de Vries, Langston Hughes, Arthur Laurents, Marianne Moore, Arthur Schlesinger, Jr. and Irwin Shaw. **NATIONAL INSTITUTE OF ARTS AND LETTERS** (\$1,000): "for distinguished achievement" to Ralph Hodgson. **ANISFIELD-WOLF AWARD** (\$2,000 each): Wallace Stegner and editors of *Look* magazine, *One Nation*; St. Clair Drake and Horace R. Cayton, *Black Metropolis*. **ATLANTIC MONTHLY AND METRO-GOLDWYN-MAYER AWARDS** for "Atlantic Firsts" (\$1,500): Cord Meyer, Jr., *Waves of Darkness*; (\$750): Thomas Heggen for *Mister Roberts*. **CAREY-THOMAS AWARD:** for the most distinguished example of creative publishing, Alfred A. Knopf, Inc., for *The American Language* by H. L. Mencken, of which the first supplement was issued in 1945. Honorable mention to Simon & Schuster for the handling of *General Marshall's Report* (paper and cloth editions) and to Lothrop, Lee and Shepard for the publication of *One God: The Ways We Worship Him* by Florence Mary Fitch, a book explaining to children the three great religious groups, Jewish, Catholic and Protestant. **COMMONWEALTH CLUB OF CALIFORNIA:** GOLD MEDALS: Adria Locke Langley, *A Lion in the Streets*; Laura L. Hinkley, *Charlotte and Emily* (the Brontës); Silver Medals: John J. Espey, *Minor Heresies*; Idwal Jones, *High Bonnet*; Victor Wolfgang von Hagen, *South America Called Them*; Margaret Leighton, *The Singing Cave*. **DODD, MEAD PRIZES.**—DODD, MEAD-REDBOOK FICTION PRIZE (\$10,000): Loula Grace Erdman, *The Years of the Locust*; **RED BADGE DETECTIVE STORY PRIZES** (\$1,000 each): Franklyn Pell, *Hangman's Hill*, and Lee Wilson, *This Deadly Dark*; **INTERCOLLEGIATE LITERARY FELLOWSHIP:** Hilda D. Osterhout, *Field of Old Blood*. **DOUBLEDAY, DORAN NOVEL PRIZE** (\$20,000): Oswald Wynd, *The Black Fountains*. **FRIENDS OF AMERICAN WRITERS** (\$750): Dorothy Langley, *Dark Medallion*. **JOHN SIMON GUGGENHEIM MEMORIAL FOUNDATION POST-SERVICE FELLOWSHIPS** (\$2,500 each): Dr. Herbert Aptheker, John Bakeless, Sam Byrd, Paul Horgan, Everette Howard Hunt, Jr., Oliver La Farge, Dr. Stephen Addison Larrabee, Caroline Backe McMahon, James R. Newman, Dr. Donald McGranahan, Bradford Smith, Dr. Ernest Robert Tinkham. **O. HENRY MEMORIAL AWARD PRIZE STORIES:** \$300 first prize, John Mayo Goss, *Bird Song*; \$200 second prize, Margaret Shedd, *The Innocent Bystander*; \$100 third prize, Victor Ullman, *Sometimes You Break Even*; \$100 (a first published story), Cord Meyer, Jr., *Waves of Darkness*. **HARPER PRIZE NOVEL CONTEST** (\$10,000): Jo Sinclair, *Wasteland*. **AVERY HOPWOOD FICTION AWARDS:** Andrina Iverson, *The Gifts of Love*; Peggy Goodin, *Clementine*; Josephine Eckert, *The Practicing of Christopher*. **HOUGHTON MIFFLIN LIFE IN AMERICA AWARD** (\$2,500 each): Russell Lord, *The Wallaces of Iowa*; James Thomas Flexner, *First Flowers of Our Wilderness*. **HOUGHTON MIFFLIN LITERARY FELLOWSHIPS** (\$2,400 each): Jacqueline Shohet Margoliash, *The House of Jacob*; Helen Mears, a book about postwar Japan; Donald MacRae, *Dwight Craig*. **IOWA LIBRARY ASSOCIATION AWARD,** The JOHNSON BRIGHAM MEMORIAL PLAQUE: Dattell Garwood, *Artist in Iowa*. **LEAGUE OF AMERICAN PEN WOMEN AWARD:** Taylor Caldwell, *This Side of Innocence*. **JULIAN MESSNER, INC.** (\$5,000): Shirley Graham, *There Was Once a Slave: The Heroic Story of Frederick Douglass*. **METRO-GOLDWYN-MAYER ANNUAL NOVEL AWARD** (\$125,000): Mary Renault, *Return to Night*. **HARRIET MONROE POETRY AWARD** (\$500): Wallace Stevens, *Notes Toward a Supreme Fiction*. **NEW ENGLAND WOMEN'S PRESS ASSOCIATION MEDAL:** Elisabeth Ogilvie, *Storm Tide*. **W. W. NORTON & COMPANY MEDICAL AWARD** (\$3,500): Dr. Edward H. Hume, *Doctors East, Doctors West*. **OHIOANA LIBRARY AWARDS:** Dorothy James Roberts, *A Durable Fire*; Arthur M. Schlesinger, Jr., *The Age of Jackson*; James Thurber, *The White Deer*; Carl Frederick Witke, *Against the Current*; Alice Monk Mears, *Brief Enterprise*; Louis Bromfield (special medal). **PULITZER PRIZES:** Drama, Howard

Lindsay and Russel Crouse, *State of the Union*; history, Arthur M. Schlesinger, Jr., *The Age of Jackson*; biography, Linnie Marsh Wolfe, *Son of the Wilderness*; no awards in fiction and poetry. **SCRIBNER PRIZE IN AMERICAN HISTORY** (\$10,000): Allan Nevins, *Ordeal of the Union*. **SHELLEY MEMORIAL AWARD:** Karl Shapiro, *Essay on Rime*. **CONSTANCE LINDSAY SKINNER AWARD:** Amy Loveman, associate editor of *Saturday Review of Literature*. **SOUTHERN AUTHORS AWARD** (\$150): Josephine Pinckney, *Three O'Clock Dinner*. **SEWANEE REVIEW AND PRENTICE-HALL AWARD** (\$200 each): Malcolm Cowley, *William Faulkner's Legend of the South*; Andrew Lytle, *The Guide*; (\$100): Sergeant Randall Jarrell, *Marchen*. **WALT WHITMAN SOCIETY OF AMERICA AWARD:** Robert Payne, *Torrents of Spring*; Louis Adamic, *A Nation of Nations*. **YALE SERIES OF YOUNGER POETS** (1945 award): Eve Merriam, *Around the House*; (1946 award, posthumous): Joan Vincent Murray, *Poems*.

Children's Books.—CALDECOTT MEDAL: Maud and Miska Peter-
sham for their illustrations to *The Rooster Crows*. **JULIA ELLSWORTH FORD FOUNDATION** (\$1,250): Genevieve Torrey Eames, *A Horse to Remember*. **JUNIOR SCHOLASTIC GOLD SEALS:** Harold McCracken, *Sentinel of the Snow Peaks*; Cornelia Spencer, *The Land of the Chinese People*. **NEW YORK HERALD TRIBUNE SPRING BOOK FESTIVAL** (\$200 each): Clayton Knight, *The Quest of the Golden Condor*; Jean Bothwell, *The Thirteenth Stone*; Gustav Tenggren (illustrator) and Kathryn and Byron Jackson (authors), *Farm Stories*. **JOHN NEWBURY MEDAL:** Lois Lenski, *Strawberry Girl*. **YOUTH TODAY CONTEST** (\$3,500): Phyllis Whitney, *Willow Hill*. (B. G.M.; X.)

Great Britain

JAMES TAIT BLACK MEMORIAL PRIZES (£250 each): 1937, Lord Eustace Percy, *John Knox*; Neil M. Gunn, *Highland River*; 1938, Edmund Chambers, *Samuel Taylor Coleridge*; C. S. Forester, *A Ship of the Line and Flying Colours*; 1939, David Douglas, *English Scholars*; Aldous Huxley, *After Many a Summer*; 1940, H. F. M. Prescott, *Spanish Tudor*; Charles Morgan, *The Voyage*; 1941, John Gore, *King George V*; Joyce Cary, *A House of Children*; 1942, A. Ponsonby, *Henry Ponsonby, His Life from his Letters*; Arthur Waley, translation of Wu Ch'eng-en's *Monkey*; 1943, G. G. Coulton, *Fourscore Years*; Mary Lavin, *Tales from Beccive Bridge*; 1944, Cicely Wedgewood, *William the Silent, 1533-1584*; Forrest Reid, *Young Tom*; 1945, D. S. MacColl, *Wilson Steer*; L. A. G. Strong, *Travellers*. **HAWTHORNDEN PRIZE** (£100 and silver medal): 1937, Ruth Pitter, *Trophy of Arms*; 1938, David Jones, *In Parenthesis*; 1939, Christopher Hassall, *Penthesperon*; 1940, James Pope-Hennessy, *London Fabric*; 1941, Graham Greene, *The Power and the Glory*; 1942, John Llewelyn Rhys, *England is my Village*; 1943, Sidney Keyes, *The Cruel Solstice and The Iron Laurel*; 1944, Martyn Skinner, *Letters to Malaya*; at the end of 1946 no subsequent awards had been announced. **THE STOCK PRIZE** (formerly the "Prix Femina-Vie Heureuse Anglais"; £40; suspended after 1939): 1937, Margaret Lane, *Faith, Hope, No Charity*; 1938, Richard Church, *The Porch*; 1939, Robert Graves, *Count Belisarius*. **THE KING'S GOLD MEDAL FOR POETRY** (offered every three years): 1937, W. H. Auden, *Look Stranger*; 1940, Michael Thwaites, *Milton Blind*. **CARNEGIE MEDAL:** 1937, Eve Garnett, *The Family from One End Street*; 1938, Noel Streatfield, *The Circus is Coming*; 1939, Eleanor Dooley, *Radium Woman*; 1940, Kitty Barne, *Visitors from London*; 1941, M. Treadgold, *We Couldn't Leave Dinah*; 1942, "B.B." (D. J. Watkins-Pitchford), *The Little Grey Men*; 1943, no award; 1944, Eric Linklater, *The Wind on the Moon*; at the end of 1946 no further awards had been announced. **JOHN LLEWELYN RHYS MEMORIAL PRIZE** (£25): 1941, Michael Richey, *Sunk by a Mine*; 1942, Morwenna Donnelly, *Beauty for Ashes*; 1943, Alun Lewis, *The Last Inspection*; 1944, James Aldridge, *The Sea Eagle*; 1945, Oriol Malet, *My Bird Sings*. **NEWDIGATE PRIZE:** 1937, M. Stanley-Wrench, *Man in the Moon*; 1938, Michael Thwaites, *Milton Blind*; 1939, K. S. Kitchin, *Dr. Newman Revisits Oxford*; no further awards had been announced at the end of 1946. **BRAZIL PRIZE** (£50): Robert Conquest, *For the Death of a Poet*. **WILLIAM HEINEMANN BEQUEST AWARD** (£200): 1945, Norman Nicholson, *Five Rivers*.

France

GRAND PRIX DE LITTÉRATURE (10,000 francs): 1938, Tristan Derème; 1939, Jacques Boulenger; 1940, Edmond Pilon; 1941, Gabriel Faure; 1942, Jean Schlumberger; 1943, Jean Prévost; 1944, André Billy; 1945, Jean Paulhan; 1946, Daniel-Rops. **PRIX DU ROMAN** (5,000 francs): 1937, G. de Pourtales, *la pêche miraculeuse*; 1938, Jean de la Varende, *Le Centaure de Dieu*; 1939, Antoine de Saint Exupéry, *Terre des hommes*; 1940, Edouard Peisson, for his collected works; 1941, Robert Bourget-Pailleron,

for his collected works; 1942, Jean Blanzat, *L'orage du matin*; 1943, J. H. Louwyck, *Danse pour ton ombre*; 1944, Pierre Lagarde, *Valmaurie*; 1945, Marc Blancpain, *Le Solitaire*; 1946, Jean Orieux, *Fontagne*. PRIX LOUIS BARTHOU: 1940, Victor Giraud; 1941, Henri Malo; 1942, Paul Valéry; 1943, Louis Gillet; 1944, René Grousset; 1945, Mme. Paul Hazard; 1946, Henri de Montfort. PRIX GONCOURT (value 5,000 francs): 1937, Charles Plisnier, *Faux passeports*; 1938, Henri Troyat, *L'araignée*; 1939, Philippe Hériat, *Les enfants gâtés*; 1940, reserved for a returning prisoner of war; 1941, Henri Pourrat, *Vent de mars*; 1942, Marc Bernard, *Pareils à des enfants*; 1943, Marius Grout, *Passage de l'homme*; 1944, Elsa Triolet, *Le premier accroc coûte 200 francs*; 1945, Jean-Louis Bory, *Mon village à l'heure allemande*; 1946, Francis Ambrière, *Les grandes vacances* (M. Ambrière is a returned prisoner of war and this prize was awarded for 1940); 1946, Jean-Jacques Croutier, *Histoire d'un fait divers*. PRIX FEMINA (5,000 francs): 1937, Raymonde Vincent, *Campagne*; 1938, Felix de Chazournes, *Caroline ou le Départ pour les îles*; 1939, Paul Vialar, *La rose de la mer*; 1940 to 1943, prize suspended; 1944-1945, anthology in six volumes, *Sous l'oppression*; 1945, Anne-Marie Monnet, *Le Chemin du soleil*. PRIX THÉOPHRASTE-RENAUDOT: 1937, Jean Rogissart, *Mervale*; 1938, P. J. Launay, *Léonie la bienheureuse*; 1939, Jean Malaquais, *Les javanais*; 1940, no award; 1941, Paul Mousset, *Quand le temps travaillait pour nous*; 1942, Roger Gaillard, *Les liens de chaîne*; 1943, Dr. Soubiran, *J'étais médecin avec les chars*; 1944, Roger Peyrefitte, *Amitiés particulières*; 1945, Henri Bosco, *Le mas théotime*; 1946, David Rousset, *L'univers Concentrationnaire*. PRIX INTERALLIE (honorary award, suspended from 1940 to 1944); 1937, Romain Roussel, *La vallée sans printemps*; 1938, P. Nizan, *La conspiration*; 1939, R. de Lafforest, *Les figurants de la mort*; 1945, Roger Vaillant, *Drôle de jeu*. PRIX DES CRITIQUES: 1945, Romain Gary, *Education Européenne*; 1946, Agnes Chabrier, *Vie des morts*.

U.S.S.R.

The principal literary awards are the STALIN PRIZES inaugurated in 1941, and administered by the Stalin Prize committee. Two first prizes of 100,000 roubles and two second prizes of 50,000 roubles are given for outstanding works in prose, poetry, drama, and literary criticism. First prizes: Ilya Erenburg, *The Fall of Paris* (novel); V. Yan (Yanchevetsky), *Genghiz Khan* (novel); Nikolai Tikhonov, *Kirov is with us* (poem) and other verses; Konstantin Simonov, *The Man from Our Town* (play); Alexander Korneichuk, *In the Ukrainian Steppes* (play); 1942, Alexei Tolstoy, *Road to Calvary* (novel); Wanda Wasilewska, *Rainbow* (novel); Maxim Rylsky, *Song of my Motherland* (poem) and other verses; Alexander Korneichuk, *Front* (play); Leonid Leonov, *Invasion* (play); 1943-1944, Vyacheslav Shishkov, *Emelyan Pugachov* (novel); Alexander Stepanov, *Port Arthur* (novel); Arkadi Kulishov, *Banner of the Brigade* (poem); Alexander Tvardovsky, *Vassili Tyorkin* (poem); Alexei Surkov, for his popular songs and poems; Mikhail Lozinsky for his outstanding translation of Dante's *Divina Commedia*; Alexei Tolstoy, *Ivan the Terrible* (play); 1945, Alexander Fadeyev, *Young Guard* (novel); Aibek, the first Uzbek writer who could claim to have a truly realistic approach to literature, *Navoi* (biographical novel); Boris Lavrenev, *For Those who Are at Sea* (play); and Avetik Saakian (Armenia) and Yakub Kolas (Byelorussia), for their poems. (For prizes in other fields see ART EXHIBITIONS; MATHEMATICS; MINERALOGY; MOTION PICTURES; RED CROSS; SCULPTURE; SOCIETIES AND ASSOCIATIONS; THEATRE; etc.; see also NOBEL PRIZES; PULITZER PRIZES; and the articles on national literature, e.g., FRENCH LITERATURE, SPANISH LITERATURE, etc.)

BIBLIOGRAPHY.—For historical information, see Charlotte E. Murray, *Famous Literary Prizes* (1934); Bessie Graham, *Famous Literary Prizes and their Winners* (1939); *Books Abroad* (University of Oklahoma).

Literature

See AMERICAN LITERATURE; BELGIAN LITERATURE; BOOK PUBLISHING; CANADIAN LITERATURE; CENTRAL EUROPEAN AND BALKAN LITERATURE; CHILDREN'S BOOKS; ENGLISH LITERATURE; FRENCH LITERATURE; GERMAN LITERATURE; ITALIAN LITERATURE; LITERARY PRIZES; NOBEL PRIZES; PORTUGUESE LITERATURE; PULITZER PRIZES; RUSSIAN LITERATURE; SCANDINAVIAN LITERATURE; SPANISH-AMERICAN LITERATURE; SPANISH LITERATURE.

Lithium Minerals

Commercial demand for lithium is filled by the natural minerals amblygonite, spodumene and lepidolite, and as dilithium sodium phosphate, obtained as a by-product in potash recovery at Searles Lake, Calif. Combined production, ores and compounds, in the United States was as follows, in short tons:

Production, LiO ₂ Content			Production, LiO ₂ Content		
1937	1,357	?			
1938	892	?	1942	5,405	299
1939	1,990	?	1943	8,155	463
1940	1,961	113	1944	13,319	848
1941	3,932	209	1945	3,440	274

With the termination of war contracts, output dropped in 1945 almost to the prewar level, and the industry attempted to develop peacetime uses.

Lépidolite is used directly as a component of certain types of glass, to increase the fluidity, index of refraction and toughness. Spodumene counteracts shrinkage in ceramic bodies, and in glazes gives a lower maturing temperature, thus lessening the strain on furnace refractories. Lithium chloride and fluoride are used in welding rod coatings. A lithium-calcium alloy is effective in removing nitrogen and oxygen from molten copper, and lithium has been used as a constituent of bearing alloys. Lithium salts have been used as a dehydrating agent in air conditioning, and in the production of a noncorrosive atmosphere in furnaces for heating steel. An outstanding war development was the use of lithium hydride as a source of hydrogen for the inflation of the radio antenna balloons that were a part of navy rescue equipment. (G. A. Ro.)

Lithography

See PRINTING.

Lithuania

Established as a republic after World War I, Lithuania was the southernmost of the three Baltic states on the eastern shore of the Baltic sea. Bounded on the north by Latvia, on the northeast tip by the U.S.S.R., on the east and southeast by Poland and on the south and southwest by East Prussia, its area (including Klaipeda [Memel] but excluding Vilnius [Wilno]) was 21,489 sq.mi. Total population (census 1938) 2,549,668; 1941 estimate, 2,879,070 (including Vilnius, but excluding Klaipeda). The chief towns: Kaunas (capital, 1938) 220,000 (1941 est.) 120,000; Klaipeda (1938) 50,000; Panevezys (1938) 28,000 (1941 est.) 25,000; Siauliai (1938) 30,000 (1941 est.) 27,000.

A new constitution was promulgated on May 12, 1938. Its main features were: (1) The president of the republic to be elected for a term of seven, in place of the previous term of three, years; (2) the president to appoint or to dismiss the prime minister and state comptroller; (3) when the seimas (parliament) was not in session the president could enact laws, which, however, were to be approved or annulled when the seimas was again in session; (4) the president could dissolve the seimas before its term of five years had expired. President: Antanas Smetona (Dec. 17, 1926-June 15, 1940). Prime ministers: Juozas Tubelis (June 13, 1934-Dec. 4, 1938); Vladislovas Mironas (Dec. 5, 1938-Nov. 20, 1939); Antanas Merkys (Nov. 21, 1939-June 15, 1940); Justinas Paleckis (after June 18, 1940).

Territorial Grab-bag.—Until 1938 no official relations existed between Lithuania and Poland, the government of Kaunas refusing to recognize the Polish-Lithuanian fron-

tier fixed as final by Great Britain, France, Italy and Japan on March 15, 1923. Lithuania continued to claim Vilnius as its historic capital, although out of its total population of 195,100 (Polish census of 1931) 128,600 (66%) were Poles, 54,600 (28%) Jews, 7,400 Russians and about 2,000 Lithuanians. On March 18, 1939, Poland sent an ultimatum to Lithuania demanding the immediate opening of the frontier—that is, the recognition of it—and the establishment of normal diplomatic relations between the two countries. Lithuania agreed.

Within a year Lithuania was presented with another ultimatum which this time meant the loss of its only port and of the lower reaches of its single notable river—Nemunas (Niemen). On March 21, 1939, Germany sent an ultimatum to Lithuania asking for the immediate return of Klaipeda (Memel), and the Lithuanian government had to restore to the third reich a territory of 1,099 sq.mi. with a population of 152,660 (off. est. Jan. 1, 1938). This territory, detached from Germany by the treaty of Versailles, had been given to Lithuania by Great Britain, France, Italy and Japan on May 8, 1924.

Although the signing of the German-soviet nonaggression pact of Aug. 23, 1939, was made known to the world, all the contents were not disclosed. A secret additional protocol clause stated:

In the event of a territorial and political transformation of the areas belonging to the Baltic states (Finland, Estonia, Latvia and Lithuania), the northern frontier of Lithuania will automatically be established as the boundary of the spheres of interest of Germany and the U.S.S.R., and at the same time both parties will recognize Lithuania's claim to the Vilna territory.

The protocol, like the pact, was signed by Joachim von Ribbentrop and Vyacheslav M. Molotov. Evidently the terms of this protocol were not satisfactory, since in Moscow on Sept. 28, 1939, a further document was signed by the same plenipotentiaries. It was the second secret additional protocol to the German-soviet nonaggression pact. It read:

The secret additional protocol, signed on Aug. 23, 1939, is changed in paragraphs 1 and 2 in such a way that the territory of the Lithuanian state is included into the Soviet union's sphere of influence. . . . At the moment when the soviet government takes steps on Lithuanian territory for the purpose of realizing its interests, the present German-Lithuanian frontier will be rectified in such a way that the Lithuanian territory south and south-west of the line marked on the attached map will fall to the Germans.

On Oct. 10, 1939, a mutual assistance pact was signed in Moscow by Juozas Urbšys, the Lithuanian minister for foreign affairs, in accordance with which Lithuania was compelled to admit soviet garrisons and to grant air bases on Lithuanian territory. The soviet government solemnly reiterated its promise to respect Lithuania's sovereignty and not to interfere in Lithuania's internal affairs. Article VII of this mutual assistance pact read as follows:

Fulfillment of this treaty shall not in any way affect the sovereign rights of the contracting parties, in particular their state organization, economic and social systems, military measures, and generally the principle of nonintervention in internal affairs.

In the peace treaty of Moscow (July 12, 1920) Russia had not only "voluntarily and for ever renounced all sovereign rights possessed by Russia over the Lithuanian people and territory," but also "ceded" to Lithuania the province of Vilnius—an area of about 11,194 sq.mi. with a mainly Polish population of 1,275,000. On Oct. 10, 1939, however, Russia "ceded" the Vilnius area to Lithuania in

much narrower confines than those of July 12, 1920—an area of about 3,219 sq.mi. with a population of 489,000 (69% of which was Polish). Foreign Commissar Molotov, speaking in Moscow on Oct. 31, 1939, said: "The U.S.S.R. decided to hand over the city of Vilnius to the Lithuanian republic not because it is inhabited by a Lithuanian majority. No, indeed, Vilnius has a majority of non-Lithuanian population." After the loss of Klaipeda and the gain of Vilnius the total area of Lithuania was 22,958 sq.mi. with population estimated at 2,879,070.

Three Invasions.—On June 15, 1940, the soviet army crossed the Lithuanian frontier and occupied the country. With the Red army came the special soviet emissary, Vladimir G. Dekanozov, one of the deputy commissars for foreign affairs. He directed the change in government. (President Smetona fled the country and went to the U.S., where he died in Cleveland, O., on Jan. 9, 1944.) On June 18, 1940, Justinas Paleckis, an obscure journalist, was chosen as head of the puppet government. The Russians ordered Paleckis to dissolve the seimas and to stage new elections.

Notices appeared on July 7 that an election was to be held on July 14. No party, except the Communist, was allowed to put forward candidates. The newly elected members of the "people's seimas" were convened on July 21. The first and only question on the agenda was a resolution requesting the soviet union to permit Lithuania to become a member of the U.S.S.R. Having passed the resolution, the "people's seimas" dispersed. The soviet union granted the request on Aug. 3, 1940.

In July 1940 the soviet union demanded that every foreign legation and consulate in Lithuania terminate its activities and leave the country not later than Aug. 15, 1940. This was done, although in some cases a further two weeks' grace was given. After that date information about events in Lithuania had not the same accuracy as previously. However, it was certain that during the year of Russian occupation mass arrests and deportations to Siberia numbered many thousands.

The German forces entered Lithuania on the day Germany attacked the U.S.S.R.—June 22, 1941. A general revolt against soviet rule broke out the same day. Lithuania was proclaimed part of the newly formed *Ostland* province of greater Germany. An attempt was made to gain the favour of the Lithuanian people by the Germans' posing as liberators, but German actions proved the contrary. New settlers were brought from Germany. What had previously been passive resistance to the German invaders became active in many parts. The Germans massacred the Jewish population; scarcely 10% was alive when the Russians returned.

At the beginning of July 1944 the soviet army again crossed the eastern boundary of Lithuania and drove the Germans out of the country by the end of the same month. A second period of Russian occupation started. The sovietization of Lithuania, begun under the first Russian occupation, was renewed with increased vigour. While passive resistance was the part played by the Lithuanian people to the first occupation, active resistance in several areas was a feature of the second. Reliable news of conditions in Lithuania was fragmentary, but it was reported that numerous bands of Lithuanian "bandits" were engaging in armed conflict with the Russian troops and the N.K.V.D. That this resistance was continuing in 1946 could be deduced from the *Order of the People's Commissar of the Lithuanian Soviet Socialist Republic* published in Vilnius on Feb. 15, 1946: "Chiefs of districts and communes of the people's commissariat of the interior, the armed forces of

the N.K.V.D. and groups of the people's defenders to clear up all districts of the Lithuanian S.S.R. from the remnants of Lithuanian-German Nationalists." (H. F. AN.)

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Lithuania: Statistical Data, 1938		
Item	Value (000's omitted)	Amount or Number
Exchange rate		
United States		1 lita = 17 cents
Great Britain		28 litas = £1
Finance		
Government revenues	\$63,069 (£12,900)	
Government expenditures	\$62,303 (£12,744)	
Gold reserves	\$11,000 (£2,250)	
National debt	\$22,535 (£4,609)	
Transportation		
Railroads		1,085 mi.*
Highways		20,426 " *
Navigable waterways		417 " *
Communication		
Telephones		26,591
Radio sets		53,667
Crops		
Potatoes		2,334,892 tons
Fodder beets		1,299,171 "
Rye		687,585 "
Oats		462,966 "
Livestock		
Poultry		5,130,920
Swine		1,249,470
Cattle		1,192,840
Forest Products		
Match sticks		2,881 tons *
Plywood		437,903,148 cu. ft.*
Sawn timber		11,855,168 cu. ft.*
Manufactures		
Total	\$37,979 (£5,659)*	...
Food	\$5,995 (£1,213)*	...
Wood and paper	\$5,554 (£1,123)*	...
Textile	\$4,010 (£811)*	...
Exports—Total	\$39,644 (£8,109)	...
Butter	\$8,238 (£1,685)	...
Meat	\$6,153 (£1,259)	...
Flax (fibre)	\$4,220 (£863)	...
Swine	\$3,614 (£739)	...
Imports—Total	\$38,027 (£7,778)	...
Yarn and thread	\$2,753 (£563)	...
Textiles	\$2,681 (£548)	...
Coal	\$1,872 (£383)	...
Defense		
Standing army personnel		25,400
Reserves		287,000
Standing air force personnel		775
Military expenditures	\$14,484 (£2,963)	
Education		
Elementary schools		2,601
Students		307,173
Secondary schools		273
Students		31,647

*1937.

Little Entente

See CZECHOSLOVAKIA; RUMANIA; YUGOSLAVIA.

Litvinov, Maxim Maximovich

Litvinov (1876–), Russian politician, was born July 17, 1876 in Bialystok, Russia. He joined the Social-Democratic party in 1898. Litvinov supported Lenin in the factional clash of 1904. After the revolution of 1917 he was the party's plenipotentiary in London, where he was imprisoned as a hostage. He took part in conferences at Genoa and The Hague, led soviet delegations at the 1927, 1928 and 1929 sessions of the preliminary disarmament commissions of the League of Nations, and in 1928 signed the Kellogg pact for the U.S.S.R. Made commissar for foreign affairs in 1930, he championed collective security at League of Nations sessions. He was suddenly dropped from his foreign office post and replaced by Molotov on May 3, 1939, in the midst of negotiations with Britain and France for a general mutual assistance pact; the mystery of his removal was solved in Aug. 1939 when Ger-

many concluded a nonaggression pact with the U.S.S.R. Litvinov was expelled from the communist party in Feb. 1941, but returned to favour after the nazis attacked the U.S.S.R. in June 1941, and was appointed soviet ambassador to the U.S. in November of that year. In Aug. 1943 he was replaced as ambassador by Andrei Gromyko. This move, coupled with the removal of Ivan Maisky from his post as ambassador at London, seemed to be an expression of Russian dissatisfaction with Anglo-U.S. failure to open a second military front in Europe. In March 1946 Litvinov was named deputy minister of foreign affairs.

Liverpool

A municipal, county and parliamentary borough and seaport of Lancashire, England, Liverpool is 201 mi. north-west of London by rail. Population 864,000 (1939). Area 42.7 sq.mi.

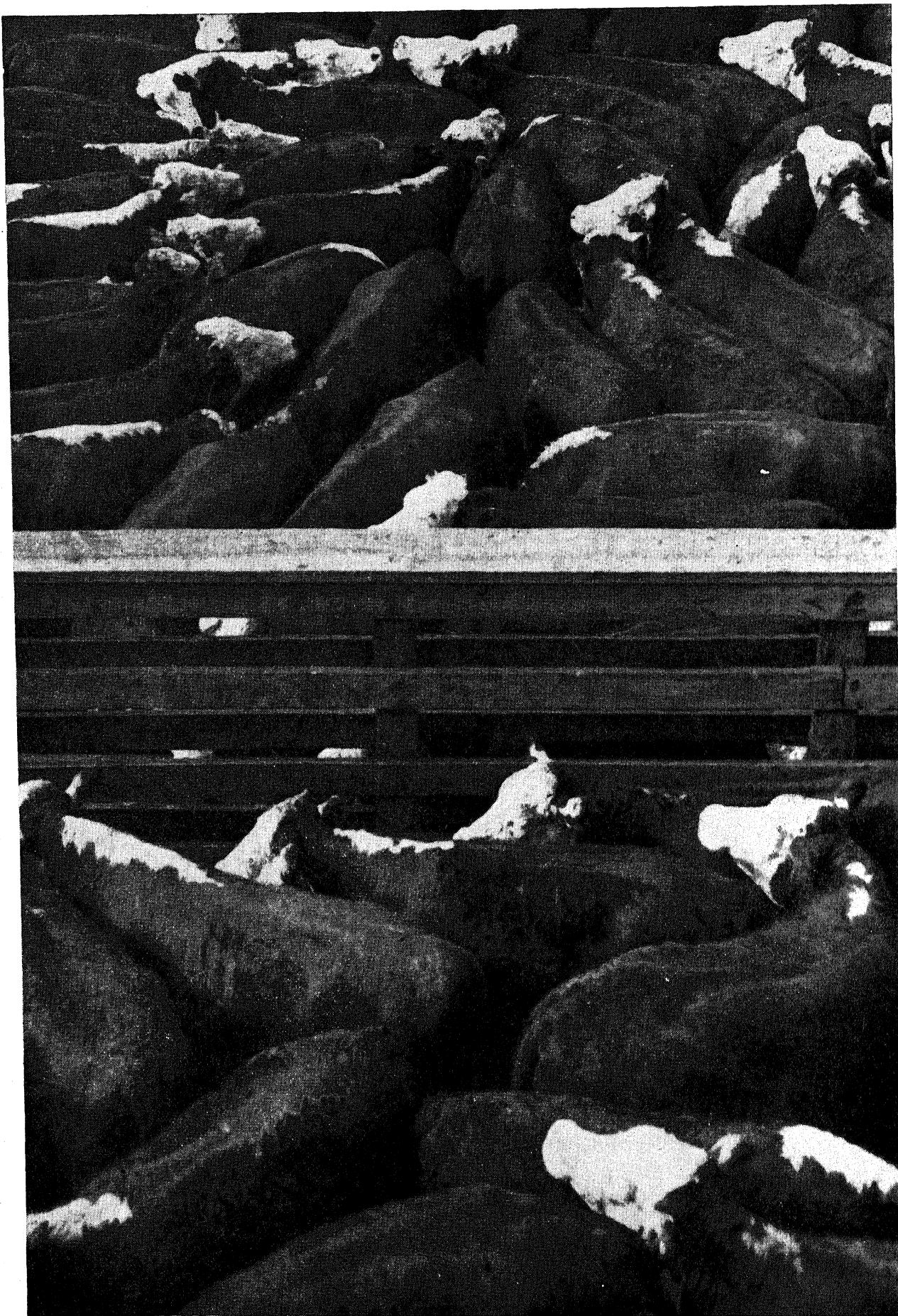
During the years 1937–46 Liverpool, besides being one of the great British seaports, grew to be an important industrial centre. Before World War II, civic administrators set about attracting industrialists to the area; tracts of land were scheduled for industrial development by the corporation, which also extended loans at a low rate of interest to assist firms in the initial stages. Industrial growth was partly arrested by the outbreak of war in 1939, but most of the factories changed over to wartime production and the erection of a large ordnance factory on the outskirts, subsequently purchased by the corporation for additional industrial expansion, further augmented the city's war effort. With the return of peace, industrial growth continued.

Through its geographical position, Liverpool became the life line of the west during World War II, and its former mercantile prosperity returned with the influx of thousands of vessels of all types. The Mersey Docks and Harbour board, which had formed a Port Emergency committee in 1936, handled the enormous increased traffic smoothly and with expedition. Its strategic importance earmarked the port for attack from the air, and it received the full fury of the luftwaffe, particularly in the eight nights' "May blitz" of 1941, when 3,966 people lost their lives and 3,812 were seriously injured. Great havoc was wrought on the dock estate and immediate environs, and extensive damage was also suffered in the residential area. The port was kept open by the magnificent work of the civil defense, and the 50,000 dock labourers, ship repairers and transport workers who toiled day and night to turn the convoys round in the shortest possible time. More than 143,000,000 tons of shipping and 75,150,100 tons of cargo were dealt with. In addition, 4,700,000 troops passed through the port. A very important part was played by the Mersey tunnel and the airport in supplementing the rapid dispersal of vital war material and supplies. It was from Liverpool that the battle of the Atlantic was fought, and the commander of the northwestern approaches had his headquarters there.

The postwar period saw a transition in handling of cotton, upon which much of the city's commerce was built. The government decided to continue the bulk purchasing which it had operated during the war, and this materially altered some of the long-established merchanting arrangements carried on in Liverpool. The city, however, quickly adjusted itself to the new situation.

Air-raid damage gave the city an opportunity of replanning; the proposed scheme included plans for an inner city ring road, with the idea of introducing the principle of gyratory traffic.

(A. E. SN.)



The world's livestock averaged nearly the same during the decade 1937-46 but varied greatly in different countries. War losses were heavy in Europe and in the western soviet union. The world's total number of cattle as estimated by the U.S. department of agriculture was 709,800,000 head in 1945 compared with an average of 723,000,000 head for the five-year period 1936-40. During this period there were increases of about 17% in North America, a loss of about 12% in Europe, 7% in Asia and 22% in the soviet union. The numbers in South America, Africa and Oceania changed but little. The world's hog total was estimated to have increased from an average of 283,500,000 head in 1936-40 to nearly 280,000,000 head in 1944. The increases in the United States and Canada were large, from about 48,000,000 head in the United States in 1936-40 to the record of 83,853,000 head in 1944, while in Canada hogs increased from 4,078,000 head to 9,473,000 head in 1944. The decline in Europe amounted to a drop from 81,000,000 head in 1936-40 to about 55,000,000 head in 1944. Most of this loss was in Germany, Poland, the Netherlands, France and Southeastern Europe. The United Kingdom cut hog numbers, because of feed shortage, from 4,380,000 head in 1936-40 to 1,866,000 head in 1944. Denmark was able to maintain its hogs almost at the prewar level because the Germans expected to continue to use Danish supplies after their expected victory. Sheep numbers declined in most countries except Australia, New Zealand and North America. In the United States an average of 51,462,000 head was reported for 1936-40, which increased to a peak of 56,735,000 head in 1942 and then began a decline. Canada maintained its sheep numbers at close to the prewar average of 2,651,000 head throughout the decade. Great Britain sharply reduced sheep numbers because of feed shortages from a prewar number of about 26,100,000 head to 20,340,000 head in 1944.

The horse and mule numbers in the world as a whole declined because of war losses and the continued reduction in numbers in the United States with the extension of motor truck and tractor. In Canada, Britain and Europe the same trend toward the horseless age was apparent. No comprehensive or reliable statistics were available on the poultry numbers of the world since the totals fluctuated sharply from year to year in many countries. Domestic fowl is not a commercial industry subject to observation as is that of larger animals marketed in central markets. Competent observers believed, however, that the effects of wartime food shortages led to the raising of more small flocks for home supplies of eggs and meat.

Total animal units on United States farms reached a record high point in 1944 as estimated by the U.S. department of agriculture. Combining all animals on a basis of feed consuming equivalents, the total units on farms in 1937 were 122,401,000; the high record of 1944 was 171,149,000.

The variations and changes in different classes of U.S. livestock were more than ordinarily unusual. Horses and mules continued to decline in numbers. All cattle increased until 1944 and then declined, likewise milk cows, hogs and chickens. Sheep made a slight advance at the outbreak of World War II, then resumed the downward trend and finished the decade with a loss of nearly 12%. Turkeys became steadily more numerous. These changes reflected

the favourable years for feed crops and the sustained or weakened war demand. The declines at the end of the war indicated the farmers' doubt regarding future markets.

The war demand for meat for both U.S. armed forces and civilians was met, and the increased consumption stimulated by full employment was amply supplied. Per capita consumption of meat had dropped to a low point of 115.9 lb. per capita in 1935, the lowest on record, and stood at 125.4 lb. per capita in 1937. By 1944, total consumption had increased to 164.6 lb. per capita. Consumption by civilians alone was only 149.6 lb. in 1944, however, because of the liberal supplies for the armed forces and the reserves taken for lend-lease. The large production of meat animals in the United States was the world's principal source of supply during the war.

Prices of livestock and livestock products in the United States reacted promptly to the outbreak of the war in 1939. The index of prices received by producers for meat animals rose from 112 in 1939 to 209 in 1943, and then declined slightly in 1945 and 1946. Measured in total cash receipts by producers, the livestock sold brought \$2,272,000,000 in 1939 and \$5,677,000,000 in 1944, an increase of more than 100%. This was not due to higher prices alone but also to the increased volume.

Livestock prices as measured by the index of the U.S. department of agriculture stood at 93 as the average of 1930-34 compared with the base of 100, 1909-14. The general price level moved up steadily through the war years to an average of 203 for 1945 and by the middle of 1946 had reached 207. Prices of meat animals advanced from an index of 85 in 1930-34 to a top of 210 in 1945 and 226 by June 1946. The advance varied somewhat between kinds of livestock. Good grade steers sold at Chicago at around \$16 per 100 lb. through most of 1944-46 and feeder steers at Kansas City at around 2 cents per lb. less. Prices of hogs were at the ceiling of \$14.76 and later \$14.85 per 100 lb. through most of 1944, 1945 and 1946. During the July period when O.P.A. was not in action the livestock markets jumped to a new high record for a few weeks. Slaughter lambs ranged from around \$14 per 100 lb. to a top of \$16.82 through 1944-46. While prices of horses and mules declined, the sales of these did not amount to enough to change the general livestock total materially. Prices of poultry advanced from the low index of 95 in 1939 to a top of 196 in 1945.

Dairy cattle, particularly milk cows, showed a similar advance.

(See also AGRICULTURE; CATTLE; HOGS; HORSES; MEAT; POULTRY; SHEEP.)

(J. C. Ms.)

Number of Livestock on U.S. Farms, 1937-46
(In millions)

	1937	1939	1941	1942	1943	1944	1945	1946
Horses	11.3	10.6	10.2	9.9	9.6	9.3	8.8	8.2
Mules	4.4	4.1	3.9	3.8	3.7	3.5	3.4	3.1
Cattle	66.1	66.0	21.4	75.1	79.1	82.3	81.9	79.7
Milk cows	24.6	24.6	25.4	26.3	27.1	27.6	27.7	27.8
Sheep	51.0	51.5	54.2	56.7	55.7	51.7	47.7	44.2
Hogs	43.0	50.0	54.2	60.3	73.7	83.8	59.7	62.3
Chickens	423.9	418.5	422.0	474.9	540.7	576.4	510.9	525.5
Turkeys	6.3	6.4	7.2	7.6	6.7	7.5	7.3	8.7

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Livestock Shows

See SHOWS (ANIMAL).

Part of the huge shipment of cattle which flooded the Union Stock yards in Chicago, Ill., during July 1946, following a temporary removal of price controls on meat and livestock

38 **Local Government***See MUNICIPAL GOVERNMENT.***Locusts***See ENTOMOLOGY.***Logistics of World War II**

Though some advance preparations in logistics (the science of providing material means and services to support the military effort) had been made in the United States and the United Kingdom prior to World War II, neither nation was adequately prepared logistically when war came.

In Sept. 1939, as the German horde erupted into Poland, the U.S. made small increases in its military establishment. After the fall of France in 1940, further moderate increases were made, but only after extended debate. In March 1941, the U.S. inaugurated its lend-lease program and production was increased to provide munitions to other nations. It was not until the Japanese attack on Pearl Harbor made the position of the U.S. with respect to the war unmistakably clear that political, industrial and labour factions united in determined preparation for war.

Expenditures for rearmament in the United Kingdom in 1938 and 1939 were modest; when France fell in 1940, only about 20% of the nation's economy was applied to military preparations. At that time most of Britain's best military equipment lay captured or destroyed in Belgium and on the beaches of Dunkirk. Stocks of tanks in the United Kingdom numbered 50. Devastating German air attacks on Coventry and other cities signalled that future preparations in the United Kingdom would not proceed unmolested.

The Allied Problem.—The darkest days of the war for the Allies prevailed in early 1942. Axis air power and submarines practically controlled the Mediterranean route to the middle east, necessitating a 12,000-mi. detour of shipping around the Cape of Good Hope to supply British forces fighting desperately to stem the advance of axis forces toward the Suez canal. In the Pacific and far east the Japanese had overrun vast areas and were knocking at the gates of Australia and India. China and the soviet union stood hard pressed and virtually in isolation. Both were in urgent need of logistic assistance. Also, the resources of western Europe, and the sources of tin, rubber, quinine and other materials in the Pacific and far east, essential to Allied preparations, served only to increase the war potential of the axis powers.

The character and magnitude of the logistic tasks confronting the Allies were clearly apparent. Ocean barriers foreshadowed major amphibious operations requiring vast quantities of landing ships and special equipment then practically nonexistent. Such operations required construction of bases in forward areas and the provision of large numbers of auxiliary vessels to support naval forces in protracted operations. Air warfare required huge quantities of planes and bombs and the construction of hundreds of new airfields throughout the world. Ground warfare required the mobilization of the largest forces ever assembled by the United States and the United Kingdom, and the provision of tanks, artillery, motor transportation and supplies in ever-increasing quantities. Widely scattered operations required shipping in quantities not then existing in the entire world. Requirements for petroleum products to operate ships, planes, mechanized units and motor transportation ran to astronomical figures. Materials

to assist China and the soviet union had to be produced, and means had to be devised for their prompt delivery.

The war potential of the Allies was sufficient to meet the demands of these formidable tasks, but time was required for planning, mobilization, the development of facilities and for production. In 1941 and 1942, this time was provided by the heroic defense of Britain by the royal air force, the stubborn soviet resistance, the tenacity of British forces in Egypt, and the victories of U.S. forces in the Coral sea and at Midway.

European Operations.—The initial U.S. and British strategy contemplated the invasion of the continent of Europe in the summer of 1943 from bases in the United Kingdom. To this end, resources were concentrated in Britain as rapidly as they became available, and the preparation of bases to support the invasion was begun. Two events in 1942 were to militate against the timely fulfillment of this plan. First, soviet forces urgently required relief from pressure of German forces and assistance, principally in the form of tanks, planes and trucks. Secondly, the axis advance toward the Suez canal was proceeding with alarming success. Axis victories at Stalingrad and in Egypt and subsequent conquest of the middle east would have been a strategic and logistic disaster for the Allies.

A paucity of equipment, especially landing craft, precluded advancing the date of the cross-channel operation to relieve the situation, and the invasion of North Africa was decided upon as the best within the means available. Accordingly, the cross-channel operation was deferred, and resources of men and materials in Great Britain and in the U.S., destined for that operation, were diverted to the north African operation. Hundreds of U.S. tanks and self-propelled guns were rushed by fast vessels from the United States, around the Cape of Good Hope, to strengthen British forces in Egypt.

To assist the soviets, an overland supply route extending 650 mi. from the Persian gulf to northern Iran, initially established by the British, was taken over by U.S. forces, and deliveries over the route were greatly increased. In July 1944, 334,000 tons of materials were delivered; by summer of 1945, 6,227,000 tons had been transferred to the Russians in northern Iran. In addition, a joint U.S.-British convoy route across the dangerous north Atlantic to northern soviet ports was established, over which several million tons of supplies and equipment were subsequently delivered. In the Pacific, Russian ships carried lend-lease cargoes from the U.S. The eventual assistance given the Russians by the U.S. amounted to about \$11,300,000,000; U.K. assistance to the soviets exceeded \$1,300,000,000.

Two distinct logistic advantages accrued to the Allies from their victories in Africa and the Mediterranean. The short Mediterranean supply route was re-established, and bases were secured for support of future operations against southern France.

From 1942 onward, Allied air bombardment of the continent continued with increasing intensity. Modern air warfare had made possible this attack on German industry and lines of communication behind German forces. Extensive successful attacks reduced resources available to German forces and limited their freedom of movement—precisely the purpose of the Allied bombardment. German divisions in western Europe exceeded those which the Allies could muster in Britain for the cross-channel operation, and, if unimpeded, could assemble at the invasion coast at a more rapid rate than Allied divisions could be put ashore. Therefore, continuing and concentrated attacks were delivered on critical German war industries to

disrupt production and deny replacement equipment and supplies to the German forces, thus reducing their effectiveness. As the invasion date approached, Allied air forces concentrated on the destruction of routes leading to the invasion coast to delay the movement of German forces to that area. The successes achieved during the invasion showed that Allied air power had accomplished its missions well; German logistic capabilities had been dealt mortal blows.

As the Allied air offensive progressed, the concentration of resources and preparation of bases in the United Kingdom to support the cross-channel operation, scheduled for the spring of 1944, were resumed. These preparations presented logistic problems of tremendous magnitude. Over 1,200,000 men, thousands of planes and millions of tons of materials had to be transported from the United States; shelter, training areas, hospital facilities, storage and shop space for these forces and their equipment were required. Several hundred miles of railroad had to be constructed, and more than 20,000 railroad cars and 1,000 locomotives were to be shipped from the United States. More than 100 new airfields had to be constructed and many others expanded and repaired. Storage facilities for millions of barrels of gasoline were required, and an extensive pipe line system developed to deliver gasoline to military installations. Shipments of materials from the U.S. increased monthly, and in the month preceding the invasion amounted to 1,900,000 tons. The United Kingdom was converted virtually into an armed camp.

On June 6, 1944, the assault of the continent, greatest amphibious operation in history, was initiated. Landing ships and craft totalling 3,780, the majority ocean-going types, carried the invasion forces across the channel, accompanied by large U.S. and royal naval covering forces and under an umbrella of aircraft. Two artificial harbours, one encompassing an area of 2 sq.mi., were constructed by sinking ships and caissons towed from Britain. Pipe lines to carry gasoline from Britain were constructed under the channel (operation "Pluto"). A system of supply over the beaches was established upon which the success of the invasion had to depend until adequate ports were captured. Within 90 days more than 2,000,000 Allied troops, and about 3,500,000 tons of materials had been landed over the beaches—an outstanding logistic achievement.

Nevertheless, the need for ports continued urgent. The Germans realized the ultimate dependence of the Allies on ports to support their expanding forces and operations and isolated German garrisons held firmly to coastal ports. The great port of Antwerp, with its facilities intact, finally fell into Allied hands early in Sept. 1944, but it was not until November, after British troops had driven stubborn German forces from the islands guarding the entrance to the port, that it was put into operation. Meanwhile, the invasion of southern France, which had been delayed to permit reuse of landing vessels employed in the cross-channel operation, was successful. By September the ports of Toulon and Marseilles, and the excellent Rhone valley railroad system were in operation. These facilities were ample to supply the southern invasion forces and also to provide important assistance in the supply of central Allied forces until Antwerp was in operation.

The advance of Allied forces across France and the Low Countries proceeded at a more rapid rate than had been anticipated, and units soon outstripped their supply lines. Vital supplies were rushed forward to armoured spearheads in large quantities by transport aircraft and heavy bombers. Special high-speed one-way motor lines were established, of which the "Red Ball" became most

famous, and fuel pipe lines were extended from the coast rapidly to supply advance forces. Prodigious feats of construction and repair of roads, railroads, bridges and airfields were accomplished. More than 4,000,000 Allied troops were being supported in western Europe when Germany collapsed.

Pacific Operations.—Land and air operations in the Pacific, though smaller in magnitude than those undertaken in Europe, were in many respects more complex logistically. Sea and amphibious operations in the vast expanses of the Pacific presented frustrating challenges in matters of supply and transportation.

The principal objective of operations against Japan up to 1944 was to secure bases from which the full power of U.S. military might could be applied against the Japanese homeland after the defeat of Germany. There began in 1942 a series of operations, limited in scope initially by scarcity of resources, but increasing in magnitude in 1943 and 1944 as munitions production in the U.S. assumed enormous proportions, and as resources, additional to those required in Europe, became available. In general, these operations followed a common pattern and posed similar logistic problems. Each was an amphibious operation with landing across open beaches. Then followed the establishment of a supply system over the beaches to support operations for the capture of the objective, and the rapid provision of facilities for supporting land-based aircraft. As early as practicable, airfields were expanded or new ones were built for offensive aircraft; port and naval facilities were constructed; and the area was developed as a base from which to launch and support subsequent air and amphibious operations. As the advance in the Pacific progressed and experience was gained, these tasks were completed with remarkable speed and efficiency. Existing airfields were repaired and put into operation overnight; new airfields sprang up from virgin jungle and on coral atolls in a matter of days.

Amphibious operations required large naval task forces to convoy assault forces, bombard enemy shores, provide carrier air support and protect sea lines of communication. At times, almost constant presence of naval forces was required during the period of the operation. To permit large naval forces to remain in advance areas for protracted periods, large naval bases were established at Espiritu Santo, at Manus and at Guam. Facilities comparable with those of continental U.S. navy yards were installed. Floating drydocks, capable of accommodating the largest vessels, were constructed in the U.S. and towed sectionally to advance bases in the Pacific. Large numbers of auxiliary vessels were added to fleets to provide ready sources of fuel, ammunition, food and other supplies. The logistic structure for support of naval forces in the Pacific was eventually developed to the extent that the greatest naval force ever assembled was able to remain at Okinawa in support of operations ashore continuously for three months.

In the spring of 1945, U.S. forces were in undisputed possession of the Philippines, Okinawa and the Marianas. Behind them stretched numerous large groups of Japanese troops helplessly isolated on Pacific islands; before them lay the Japanese homeland, open to ever-increasing devastation from the air and sea. This situation was brought about largely because, as with Germany, high priority had been given to the destruction of industry and lines of communication. U.S. submarines early began to exact a heavy toll of Japanese shipping. U.S. forces with superior

air and naval power occupied key islands from which they controlled the approaches to strongly held Japanese bases. Deprived of replacements and logistic support, the latter were rendered impotent. Loss of control of the sea deprived Japan of the resources of conquered areas so essential to its industry. This, coupled with destructive air attacks on industrial plants in Japan, prevented the Japanese from replacing, adequately, destroyed shipping, planes and other equipment. Japan's capacity to support a major overseas war began to decline early in 1944; by the summer of 1945 it had been hopelessly crippled, and the Japanese contemplated capitulation. Two atomic bombs hastened the decision.

By that time, extensive preparations were in progress for the invasion of Japan proper. Forces and resources had begun to arrive from Europe in substantial quantities, and shipments from the U.S. increased. The abrupt surrender of Japan posed two perplexing logistic problems. Huge quantities of materials assembled for the invasion on Pacific islands required disposition. Insistent popular demand for the immediate return of troops from overseas created perhaps the greatest transportation problem of the war.

Far Eastern Operations.—The summer of 1943 found China practically isolated from its Allies and desperately in need of munitions, if it were to continue resistance. Small quantities were being flown into China by U.S. aircraft from India, but these were even insufficient to supply U.S. air forces operating in China. Moreover, China's greatest need was for tanks, artillery, trucks and other heavy equipment—items not readily transportable by air. Operations to clear the Japanese out of Burma and to reopen the Burma road from Rangoon into China were highly desirable, but higher priority of European and Pacific operations denied the resources (particularly landing craft) for such a major undertaking. It was decided to conduct operations in north Burma with the limited resources available to drive the Japanese southward and to capture territory over which a new road, several hundred miles long, could be constructed from Assam to join that part of the Burma road which remained in Allied possession. As the advance of British, Chinese and U.S. forces continued slowly southward, under extremely adverse conditions of weather and terrain, engineers followed closely, constructing the road and an accompanying fuel pipe line. The new road was finally completed in Feb. 1945, and during that month 22 convoys comprising 2,170 vehicles travelled the route into China. By the end of August, 123,000 tons of supplies and equipment had been delivered. Shortly after the opening of the road, gasoline flowed into China through a pipe line more than 1,000 miles long.

Supply by air into China continued as construction of the road proceeded. Additional planes and facilities were employed, and a shorter, less hazardous, air route became available as the Allied forces advanced. Deliveries rose from about 2,000 tons in June 1943, to more than 70,000 tons in July 1945. By Aug. 1945, more than 400,000 tons had been delivered to airfields in China, some of which had been constructed of stone broken, carried, and laid by hand, by thousands of Chinese.

The road and air transport projects, while in themselves major logistic accomplishments, necessitated a supporting project of great proportions. Eastern terminals were in Assam and East Bengal, and materials for China and for support of construction and operating forces, in

addition to materials for combat forces, had to be transported to the terminals from Calcutta some 700 mi. away. A rail route was reconstructed and augmented, and U.S. personnel were provided for operation. Two large pipe lines were extended from the Calcutta area to supply the great quantities of gasoline required. A U.S. barge line was inaugurated, and the port of Calcutta was reconstructed and expanded until its rate of discharge exceeded that of any overseas port.

Air supply played a major role in the support of combat operations in Burma. Up to 100,000 troops involved in fighting were at times mainly or entirely dependent on food, equipment and ammunition supplied by air. At critical stages of the operations, large forces were moved to threatened points by air. Two full Chinese divisions, urgently required, were flown from China to Assam, re-equipped, and flown to the battle area all in eight days. Without air transportation and air supply, combat operations could not have been conducted successfully in north Burma.

Production.—The successful Allied prosecution of World War II was due in large part to the application of overwhelming quantities of munitions against the axis. The achievements of industry in the United States and United Kingdom reached incredible heights.

During the five-year period 1940–45, more than 54,000,000 deadweight tons of shipping, excluding vessels of the U.S. navy, were constructed in U.S. yards. In the same period British yards added about 11,000,000 deadweight tons. Allied shipping losses during the war aggregated over 36,000,000 deadweight tons, twice the losses sustained in World War I.

Amphibious operations required the construction in the U.S. of more than 4,000 large ocean-going landing ships and craft, and about 79,000 smaller landing craft. The British produced several thousands of varying types.

During the period July 1940–July 1945, the U.S. produced about 297,000 military aircraft, more than 86,000 tanks, 120,000 armoured vehicles and about 2,500,000 military trucks. In the period Sept. 1939–June 1944, Britain produced more than 102,000 aircraft, 25,000 tanks, 74,000 armoured vehicles and 919,000 military trucks.

The U.S. rendered lend-lease (*q.v.*) to its Allies during the war to the extent of about \$50,700,000,000. Similar British expenditures approximated \$6,500,000,000. (See also STRATEGY OF WORLD WAR II; STRATEGIC BOMBING; TACTICS OF WORLD WAR II; WAR PRODUCTION; WORLD WAR II).

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London

London is the largest city in the world, the largest port, the largest industrial town in England and the capital city of an empire. Its vast spread, including the outer districts known as greater London, covered before World War II about 690 sq.mi. with a population which in the first three decades of the century had risen by sharp increases to about 9,000,000.

Anatomically, London consists of the City, the ancient heart of London, the county (comprising the 28 metropolitan boroughs) and greater London, once the metropolitan police area with a radius of 15 mi., now that of the London Passenger Transport board with a radius of 30 mi. Census figures show that the increase of population in recent decades was all in greater London, the county population having fallen slightly from the 4,500,000 reached in 1901, and the City resident population to 10,000.

This growth of greater London was mainly the result of the drift of people and industry to London in the years of depression which were less acutely felt in London than elsewhere. The Commission on the Distribution of Population (the Barlow report, 1937) called this a "problem demanding immediate attention" and recommended that no further industries be allowed to come to London. The Standing Conference on London Regional Planning (1937) noticed the acute transport problem and the traffic congestion produced by this vast population pivoted on a single centre for business, shopping and amusement and pointed out the "vicious circle by which transport facilities only serve to create new suburbs, which again create further demands on transport." The traffic problem was taken up in the Highway Development survey known as the Bressey report (1937), the main recommendations of which (ring roads with radial links, tunnels, widening and reorganization of main arteries and road junctions, great clearances at St. Paul's and other places lending themselves to spectacular treatment and reconsideration of railway bridges and of siting of stations) were a starting point for all subsequent plans for reconstruction.

Prewar London.—The London County council, re-elected in 1937 with an increased Labour majority, embarked upon a three years' plan for large-scale slum clearance, a new Thames tunnel, a new Waterloo bridge and improvement to the western road approaches. Powers were obtained to acquire land for the "green belt" (initiated by the London society in 1931) round the outer suburbs. By 1939, 8,000 people had been rehoused by the council, 26,000 by the boroughs; the fire brigade had new headquarters at Lambeth; John Rennie's Waterloo bridge, after much controversy, had been demolished and reconstruction had begun. The boroughs had built new town halls, at St. Pancras, Wandsworth, Hammersmith and Poplar. The University of London was installed in its new buildings; Church house, destined for an important secular role in the war, was begun. Trolley buses replaced trams over a large part of London's tramway system. All over London modern blocks were replacing old-fashioned property and some famous landmarks disappeared: Irving's theatre, the Lyceum, was closed; Daly's theatre and the old Alhambra in Leicester square gave place to cinemas; Adelphi terrace, a masterpiece of the Adam brothers, was replaced by a huge modern building. The Nash terraces in Regent's park, and the Royal Opera house, Covent garden, scheduled to be rebuilt, owed their lives to the war.

The first days of 1937 were those of a new reign. For the coronation (May 12) of King George VI and Queen Elizabeth, crowds vaster even than those which gathered for the

Jubilee (1935) witnessed a superb pageant of empire with contingents from India, the dominions and the crown colonies. In Westminster abbey the British Broadcasting corporation broadcast the ceremony with the most complicated relay hitherto attempted. During the entire month there was a bus strike, but Londoners were not disconcerted, finding in the greater freedom of the streets an enhancement of the holiday atmosphere.

The threat of war steadily grew. Between the Godesberg and the Munich agreements in 1938 mothers and children were evacuated, Londoners were fitted with gas masks and stoical, if also a trifle dismayed, Londoners watched gangs of navvies hurriedly digging shelter trenches in the parks, working far into the night by the sinister light of flares.

With the Munich agreement emergency measures ceased, to give place to more permanent preparations. A "lord mayor's fund," London's traditional mode of collective sympathy, was opened in aid of the Czechs. Upon the occupation of Prague in March 1939, the inevitable was accepted and volunteers besieged centres for every branch of civil defense. The first "Anderson" shelters to be deliv-

Guards' chapel, London, after being hit by a robot bomb in one of the attacks begun by the Germans in June 1944. The bomb struck during Sunday services, killing many of the guards



ered arrived in Islington in March and there was much discussion of the "Finsbury scheme" for deep shelters which were rejected as too expensive to construct and likely to be dangerous of access.

There were, at the same time, other troubles: fascists clashed with communists despite the prohibition (1937) of unofficial uniforms and of provocative demonstrations, and friends of the Irish republican army (I.R.A.) put explosives in letter boxes and railway luggage offices. Between Jan. and July 1939 there were 57 such outrages.

The summer of 1939 maintained some show of normality; the London County Council celebrated its jubilee, King George and Queen Elizabeth were greeted with enormous enthusiasm on their return to the capital after their transatlantic tour and held their customary summer functions. But the usual summer visits of foreign musicians and opera companies were cancelled at short notice. From Aug. 24, with the signature in Berlin of the Russian-German pact by Vyacheslav M. Molotov and Joachim von Ribbentrop, all hope of peace was a thing of the past. On Sept. 3 Britain was at war.

War.—The prime minister's broadcast on Sept. 3 was followed immediately by London's first siren—a mistake, but a useful exercise. Air attack was expected; gas masks were compulsorily carried and the black-out was imposed. In three days 54,000 mothers with 100,000 small children and 250,000 school children were evacuated in an atmosphere which the children's high spirits turned into a gigantic picnic. Businesses and sections of government departments left London; art treasures had been in process of removal since July. Entertainments and meetings were banned. Windows were stuck with netting and paper strips to prevent splintering; blast screens, shelters and sandbags appeared everywhere; barbed wire crept round government premises; balloons floated overhead, silvery by day, their tackle and impedimenta filling parks and squares; garages and schools became air raid precaution and Red Cross posts or fire stations.

As time passed without air attack, evacuees drifted back; theatres and concerts were resumed up to 10 P.M. (an alteration which outlived the war). The lunch hour concerts at the National gallery became a wartime attraction. By Christmas, since the only casualties to Londoners had been caused by collisions in the black-out with shelters, sandbags, street standards, pillar boxes and one another, a modicum of street lighting was conceded. In Jan. 1940 heavy falls of snow were added to the encumbrances in the streets; in that month the Thames froze, for the first time since 1814.

From the fall of France in June 1940 London, with spirits keyed to action after the long, strange delay, found itself in the front line. Throughout the port, dock hands were eager volunteers and craft were promptly manned for the urgent rescues of the Dunkirk beaches. It was the first time since the 17th century that sprit-sail barges had gone to war. There was fresh evacuation, and emergency defenses against invasion were hastily contrived; concrete blockhouses at strategic points were ingeniously camouflaged so as to be scarcely visible (notably the "bookstall" in Parliament square and in Trafalgar square the "information bureau" at the pedestal of Charles I's statue). Four relief bridges of timber were flung across the Thames. Fixed bayonets greeted visitors to government premises and the BBC.

On June 24 the London sirens sounded their first authentic warning, but there were no bombs. On Aug. 8

the battle of Britain began, its decisive significance scarcely guessed by Londoners as they stood enthralled to watch the frequent dogfights overhead. Aug. 15–18 constituted a climax, with a heavy daylight attack on Croydon and the airfields nearest to London, after which there was a pause. From Aug. 26, though the wider attack continued, London became the main target, with the twofold intention to terrorize Londoners and paralyze business and communications.

Air Battle of London.—For a fortnight from Aug. 26 night raids were sporadic only and confined to the outer suburbs. On Sept. 7 the battle of London began when 375 aircraft penetrated the defenses of the estuary by daylight (three previous attempts had been turned back by the royal air force), dropping bombs over a vast area from Woolwich to Tower bridge and beyond, setting wharves and warehouses ablaze, notably London docks and Surrey docks, where the fires—wheat, oil, rubber and tea—were quickly beyond the control of the fire service. The sinister glare lighted up the target conveniently for a further force of 250 bombers which rained down bombs from 8 P.M. till the small hours.

The German losses were considerable, but in that day and night more than 500 Londoners were killed, 1,500 seriously injured, thousands rendered homeless, transport and communications were out of action and whole districts in east London and the docks were reduced to smoking rubble.

From Sept. 11 the anti-aircraft barrage became more formidable, diminishing damage by disconcerting rather than hitting the Germans. There followed 57 consecutive nights of attack by forces averaging 200 bombers each night, with the sirens sounding each night regularly at dark and the "all clear" at 6 or 7 A.M. In the 100 days from Aug. 23 to Nov. 30 there were 368 alerts; Nov. 3 and 28 were the only raid-free nights.

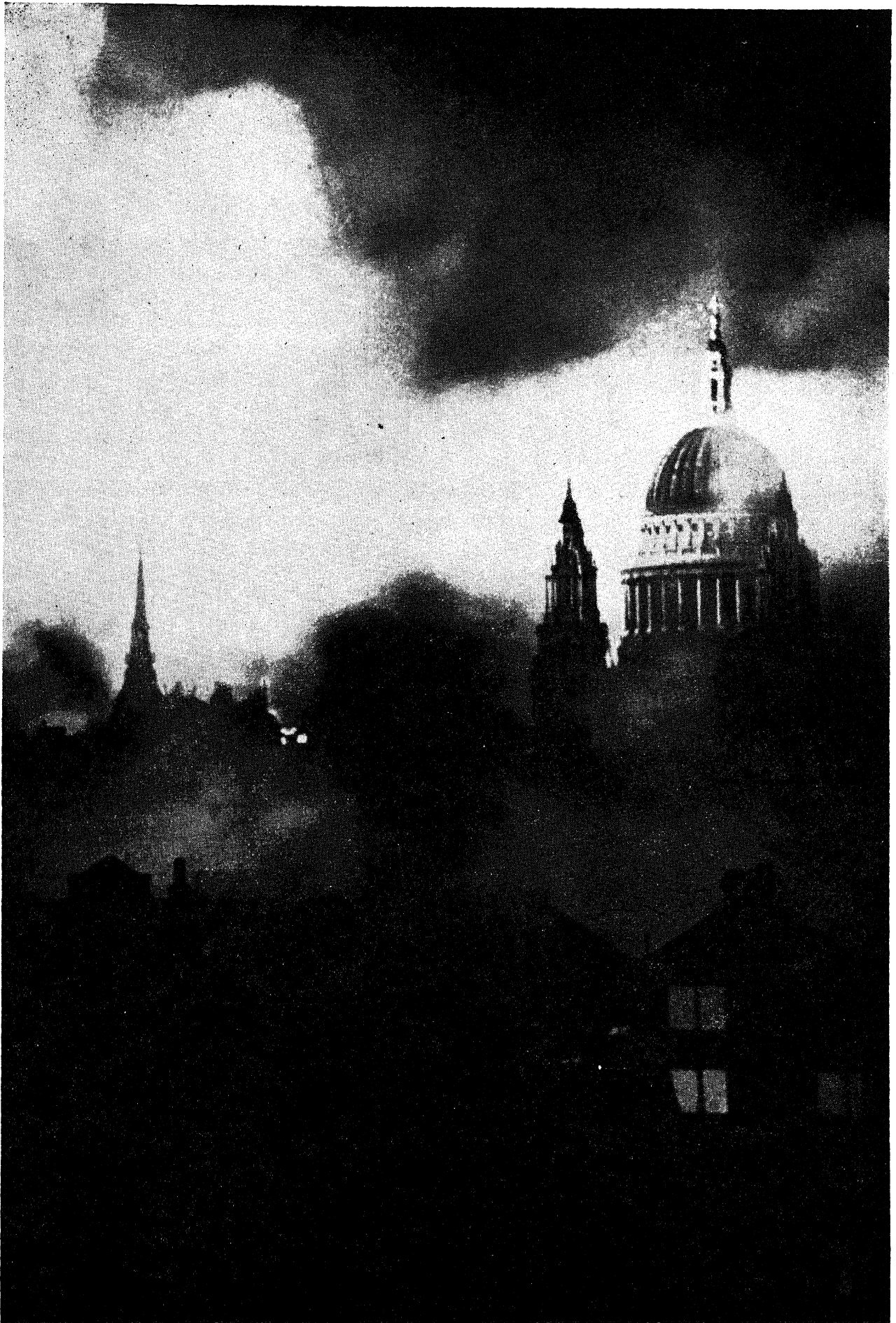
Shelter life began in all its human drama and variety; late travellers on the tube railways found the shelterers either making merry or tucked up asleep. Bunks were soon installed, and medical, catering and sanitary facilities provided. Particularly celebrated for good organization and sociability were the West Ham mission, the Aldgate vaults, and the Aldwych tube which, closed to traffic, was utilized throughout its length during the whole war.

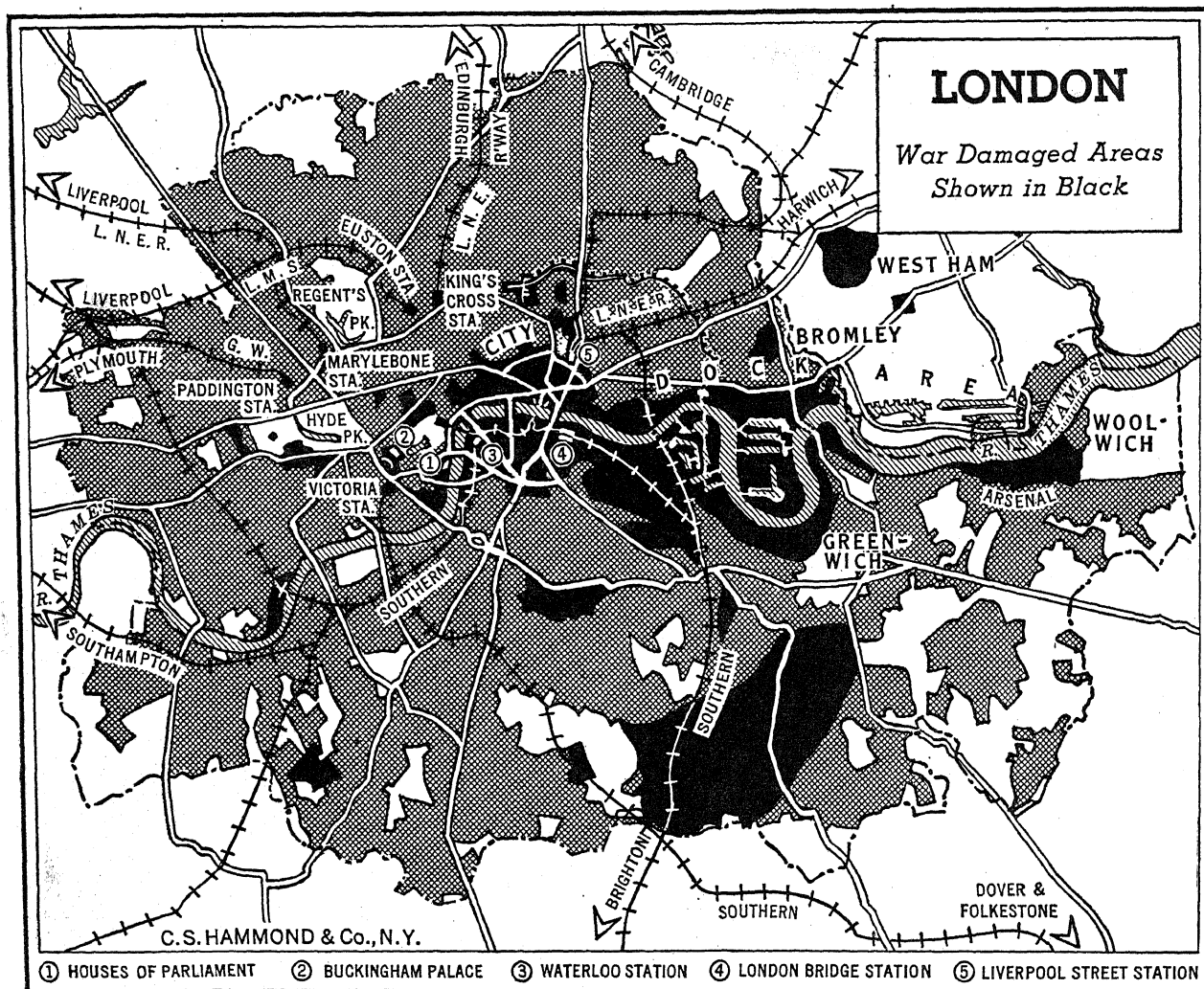
But though public shelters were fully occupied at night only 9% of Londoners made use of them; 27% had private shelters, "Anderson" or other, and the remaining 64% were on duty in some branch of civil defense, or remained at home under stairs, tables, grand pianos or just optimistically in bed.

From Sept. 15, the luftwaffe's greatest daylight defeat so far, the long-range bombers were withdrawn from daylight attack; and the protection afforded by the R.A.F. against the Messerschmitts which succeeded them was so efficacious that though sirens still sounded by daylight little notice was taken of them and life by day became almost normal in sharp contrast to the nights.

By the end of November, 13,000 Londoners had been killed, but pressure slackened as attention was paid elsewhere. If more intermittent, the raids were, however, no less severe; in the great incendiary attack on the City on Dec. 29 almost half of the area within the old City walls was destroyed, and a great area immediately outside. Among famous buildings destroyed or severely damaged

→
St. Paul's cathedral, clearly visible against a London night sky lighted by the fires of German incendiary bombs. The structure was severely damaged during the fierce raids of 1940–41





that night were the Guildhall, eight of the churches built by Sir Christopher Wren after the fire of 1666 (many more suffered in later raids) and three survivors of the 1666 fire: All Hallows, Barking-by-the-Tower, St. Olave's, Hart Street (associated with Samuel Pepys) and Austin Friars. St. Paul's cathedral, silhouetted in a sea of flames, was hit by high explosives but saved from the flames by the skill and heroism of its special band of fire watchers, professional architects.

Jan. 10 and 11 saw exceptionally heavy attacks, after which the Mansion house and the Bank of England stared at one another across a gigantic crater. There were 2 exceptionally severe attacks in March and 2 in April; in that of April 16, 450 tons of bombs came down killing more than 1,000 people. On May 10, a night of fire, the chamber of the house of commons was destroyed, the crossing of Westminster abbey fell in flames and the old canopies were burnt out. The tower, the law courts and the mint were hit, not for the first time, and there was widespread destruction.

May 10 brought the battle of London to a close. London was battered and dishevelled, but victorious. There were some slight further raids that year, the last on July 27, but nothing to worry a Londoner. In the 9 months' attack London had sustained more than half the casualties of the whole country; 1,150,000 houses were damaged, 375,000 people registered as homeless.

Respite.—From July 1941, for three years, apart from anxiety as to the general course of the war, London had

comparative peace. The house of commons sat for many months at Church house in Dean's yard till the lords gave it hospitality in their own chamber. There was a steady increase of entertainments and exhibitions, the National gallery showed each month a masterpiece temporarily drawn from its hiding place. In 1942 London was captured by its only invaders, the U.S. army, who transformed Mayfair to a 49th state, filled the streets, the parks, theatres and cinemas and rode in taxicabs to gaze in amazement at the ruins. The *Stars and Stripes* was published at the *Times* office.

Many shelters were closed, ruins were demolished, glass replaced some of the boards and calico in blasted windows. The new Waterloo bridge was opened to traffic; in the shortage of buses young people went to work and back on bicycles. Vegetables, pigs and chickens were raised on blitzed spaces and a miniature farm appeared at Cripple-gate where the remains of the Roman walls stood high above the ruins of more recent buildings. Everywhere ragwort, fleabane, fireweed and bracken crept decoratively over the ruins; mallards nested by a fire service lake in Bread street, redstarts in the ruins of the temple.

The call for munitions gathered in iron railings, to the detriment of public parks and lawns, and made every spare shed, cellar and yard a munitions dump, even the Guy Fawkes cellars of the houses of parliament. After what they had been through, Londoners viewed with dismay great fortresses being erected at the admiralty and close by the war office and strange erections rumoured to be the

entrances and ventilation shafts of new deep shelters.

In 1943 there were slight nuisance raids in one of which the Bethnal Green shelter disaster, the only one of its kind through the entire war, was caused by someone accidentally stumbling upon the entrance stairs.

In the first months of 1944 there was elation and profound security silence throughout the port of London, now a great invasion base where, among other preparations, 75% of the concreting of the "Mulberry" harbours was carried out. Blunt-nosed barges were moored at every pier in the river. In February some sharp raids, reprisals for R.A.F. attentions to Germany, did heavy damage at the treasury, St. James's palace, the London library and the adjacent district and sent casualties to 961 for the month. But spirits remained high; in April an unofficial bus strike in which buses were run by volunteers in service uniform who refrained from collecting fares merely increased the general mood of cheerfulness.

V-1 and V-2.—In May 1944 the blunt-nosed barges disappeared from the river; the Imperial conference met in London and on June 6 the Allies landed in Normandy. London with its scars and its long fortitude, was entitled to the full savour of the event; but a week later, on June 13, the first flying bomb ushered in nine months of intensive bombardment by V-1 and V-2 missiles. In the first fortnight 2,572 Londoners were killed and 400,000 houses destroyed; the unprecedented blast of a single V-1 could damage up to 1,500 houses in a built-up area. Particularly disastrous incidents occurred at the Guards' chapel, Wellington barracks, during Sunday morning service, and at Lewisham high street at the busy midday hour.

Evacuation began all over again; nearly 1,000,000 people—children, mothers with infants, the aged and infirm—were moved from London in the first six days, in conditions far worse than those of 1939, with flying bombs roaring overhead and frequent incidents. Shelter population rose in a few days to the figures of the autumn of 1940; in July the

new deep shelters with their superb organization for catering, etc., and 40,000 bunks were opened.

On Sept. 8 the first of the V-2 rockets fell, in Chiswick, their proportion to V-1s increasing as the Allies overran the V-1 launching sites in northern France. Unheralded by any siren or approaching sound, the V-2 was if possible more disagreeable than the V-1; but both had the merit that since they could not see there was no longer any point in the blackout, which was relaxed to a dimout from the end of February.

The last rocket fell on March 27, 1945, the last flying bomb on March 28; Gen. Patton had crossed the Rhine. Sheltering at night was relinquished. In the first days of May the end was in sight; on May 6 shelters were finally closed. There were bonfires all over London through the night of the 7th anticipating the announcement of the final surrender at Rheims made by the prime minister in the house of commons at 11 A.M. on the 8th, upon which the commons walked to St. Margaret's to give thanks, the lords to the abbey.

All day and night dense crowds surged through Trafalgar square, as always on great occasions, and round the palace calling for the king; and they pressed round Downing street acclaiming the prime minister, the one man who, nobody had the smallest doubt, had been the pivot upon which the world's fortunes had turned.

There was still the Japanese war, but London's war was over. Businesses and institutions began to return from evacuation and, not least of postwar problems, the evacuated families and school children, far too numerous for the surviving houses and schools.

Reconstruction.—Gradually, in 1946, large blocks and buildings were relinquished by the government; the University of London returned to its new buildings so long occupied by the ministry of information. The City turned a page in recovery when, in Sept. 1946, the wool sales, the most fundamentally traditional of all its commercial ac-

St. Paul's cathedral and neighbouring bomb-damaged areas in London as they appeared in April 1945





tivities, were held in the Wool exchange for the first time for six years. The port was handling more than half its prewar tonnage and was limited only by shortage of shipping. Postwar reaction from strain was evinced by labour unrest, strikes in the milk, meat and hotel trades; and people in search of accommodation invaded derequisitioned premises as squatters. Attempts to enforce closed-shop trade union membership were successful in the case of employees of the London Passenger Transport board, unsuccessful in the case of hospital staffs. By the spring of 1946 600,000 people had returned to the county area, 1,300,000 to greater London; and the flow continued.

Already in 1941 thoughts had turned to reconstruction, resulting in a number of plans: the Royal Academy plan (Dec. 1942), the County of London plan (1943), the City of London plan (1944, amended in 1946), the Greater London plan (1944) and the appointment of the Railway (London plan) committee (1944), which reported in 1946. The county plan proposed to limit the population of the county to 3,330,000, or 750,000 less than before the war, the surplus to be transferred to new towns under the greater London plan. The 28 metropolitan boroughs were to be regrouped into self-contained units of from 6,000 to 10,000 beginning with a £15,000,000 scheme for Stepney and Poplar. Certain districts, Westminster and the university area in Bloomsbury, were to be precincts closed to through traffic, the south bank of the river to be developed between Westminster and Waterloo bridges, additional road bridges to be constructed and Charing Cross railway bridge and station to be removed altogether.

The greater London plan divided the outer areas into four rings—an inner urban, a suburban, the "green belt," and a country ring containing a number of satellite towns complete with industries—to take the surplus population of the county, for the constitution of which powers were obtained in the New Towns act, 1946.

The Railway (London plan) committee's report (1946) recommended a number of new routes for traffic relief including new underground lines for passengers and freight to replace, as first priority, Blackfriars railway bridge and the disfiguring viaduct over Ludgate Hill close to St. Paul's. Further schemes were for new underground passenger lines linking the south bank with the City and the West End, and for the eventual removal of Cannon street railway bridge and station and an eventual reconsideration of Liverpool and Fenchurch street stations.

The City plan (1944), rejected by the ministry of town and country planning as leaving the railway stations and bridges too much to the discretion of the owners, had been amended by the Reconstruction of the City report (1946) which recommended a program to take 30 years in 3 stages and as a general objective the provision of more efficient but not greater business accommodation, with at the same time a road system providing for double the existing volume of traffic. Main features were the development of a St. Paul's precinct opening out from a new square at the junction of Queen Victoria street and Cannon street, which would also be the crossing of two great new thoroughfares, north and south, and east and west. Thames street would become an upper-level viaduct road from Blackfriars to the tower, the older through routes would be widened and a circuit of inner distributive roads formed for mixed traffic and for shopping. There would be a zoning treatment for different types of business, and the mar-

Trafalgar square, where thousands celebrated the first anniversary of victory in World War II on June 8, 1946. Londoners watched a huge parade in which troops from most Allied nations took part

kets, especially Billingsgate, would be reconsidered. The Railway committee's recommendations were recognized by the City authorities as of fundamental importance to reconstruction.

For the 20 severely bombed City churches the bishop of London's commission had recommended the reconstruction of 11, as having particular importance for the life or the ceremonial of the City; these included All Hallows, Barking-by-the-Tower (Toc H), St. Olave's, Hart street, St. Stephen's, Walbrook (the "lord mayor's church"), St. Bride's, Fleet street (the "newspapermen's church"), St. Mary-le-Bow (Bow bells), St. Michael-in-the-Royal (originally founded by Dick Whittington). The sites of the remainder would be sold or used for church halls or institutes.

Meantime, at the close of 1946 with the revival of trade and the restoration of the basic ration of gasoline, traffic congestion was a problem as pressing as in 1939; and in the much-blitzed City in central London, not one stone was raised upon another.

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Loran

See ELECTRONICS; RADAR.

Los Angeles

Fourth largest city of the U.S.A., Los Angeles had a population of 1,805,687 by a special federal census of Jan. 1946. Area, 452.2 sq.mi. Frank L. Shaw was mayor until 1938; thereafter, Fletcher Bowron.

The centennial anniversary of the raising of the U.S. flag in Los Angeles was celebrated in 1946. The year 1946 also marked the close of the most progressive decade in the city's 100-year history. No other major U.S. city had experienced the phenomenal growth in population and industrial development achieved by Los Angeles in the decade 1937-46. In this ten-year period about 500,000 persons from other states took up their residence within the city limits. The 1937 figure was estimated to be 1,322,784.

The city remained the hub of a metropolitan area embracing 34 cities and unincorporated urban districts with an estimated population of 3,600,000, the third largest concentration of people in the nation. Greater Los Angeles had moved up from seventh place in industrial production in 1939 to second.

It had become the U.S. leader in agricultural wealth, Los Angeles county being the first agricultural county of all of the states of the union. Value of the country's agricultural products rose from \$92,576,352 in 1937 to \$201,614,735 in 1945.

Los Angeles, at the close of 1946, was the world's second largest assembler of automobiles and second largest U.S. producer of rubber tires and tubes. It ranked first in the manufacture of oil-well equipment.

Only New York city exceeded Los Angeles in the manufacture of wearing apparel, while in the creation and manufacture of sportswear, Los Angeles ranked first. From 1937 to 1946, garment manufacturing skyrocketed from a

\$45,000,000-a-year business to \$400,000,000 annually, with approximately 30,000 persons employed by 1,000 manufacturers.

Leading the nation in the production of aircraft and aircraft parts, Los Angeles was considered the centre of aircraft manufacture in the U.S., with the nation's largest plants for construction of planes. These plants had a production backlog of \$619,234,000 in Nov. 1946. The city served as one of the great terminals for transcontinental and transpacific air travel and regularly scheduled flights to Mexico, Central and South America and Alaska. Air passengers clearing the city in 1943 totalled 38,967. The figure leaped to 761,452 in 1945, representing more than 11% of the national air passenger total.

To keep pace with aviation activity, a city airport commission was created in 1940. Development of a municipal airport was begun in 1941, following passage of a \$3,500,000 bond issue. This appropriation was increased in 1945, when the people approved an additional \$12,500,000 bond issue. Although nation-wide shortage of critical building material delayed construction of permanent airport buildings at the Los Angeles airport, public necessity dictated a program of intermediate facilities. These were opened in Dec. 1946, when major air lines transferred their operations from previous locations to the city airport, making it the most important commercial airport in the western U.S.

When completed, the Los Angeles airport would include approximately 3.8 sq.mi., with 7,000-ft. runways that could be extended to 10,000 ft., if required.

Long known as the world centre of the motion-picture industry, Los Angeles, with its famous Hollywood, continued in the forefront during the decade. Motion-picture studios increased their studio investment \$15,000,000 in this period. Production budgets more than doubled from \$135,000,000 in 1937 to \$300,000,000 in 1946. Studio pay rolls jumped from \$86,000,000 in 1937 to \$195,000,000 in 1946, with approximately 31,000 employees.

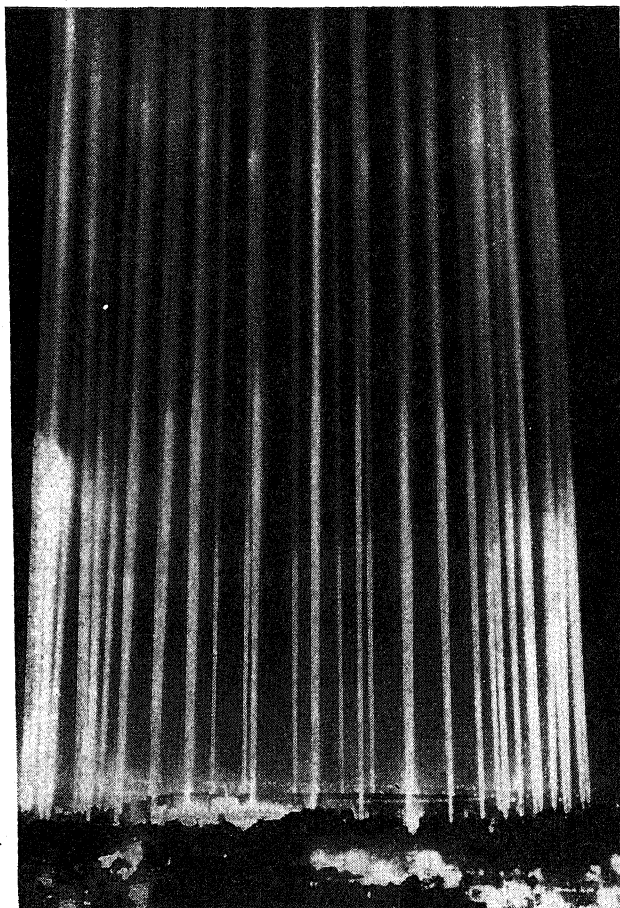
The centre of the nation's radio broadcasting shifted more and more toward Los Angeles during the decade, primarily because of the availability of artists for radio programs.

By 1946, 90% of U.S. network radio programs were originating from Los Angeles studios. The same proximity to talent activated growth of a rapidly expanding television industry.

Los Angeles harbour, largest man-made harbour in the world, continued to be the busiest port on the Pacific coast. Municipally owned and operated, its facilities were improved during the war years, and an \$11,000,000 improvement program was under way during 1946. The largest commercial fishing port in the U.S. was located at San Pedro, a part of the city of Los Angeles. Its receipts from fish and fish products totalled \$28,000,000 for 1946. The Los Angeles harbour was also the second greatest oil-exporting port of the U.S. Total tonnage of all products handled through the port rose from 18,610,713 tons in 1937 to a wartime peak of 24,188,176 tons in 1945. Gross harbour revenue to the city for the fiscal year 1945-46 was \$4,166,975.

An \$83,000,000 steel plant near Los Angeles and a \$55,000,000 synthetic rubber industry within the city limits were built during the war years and contributed to the postwar industrial growth.

In 1937 the city had a total of 2,857 industrial plants employing 85,173 persons. At the end of 1946, following



Tower of light cast by 50 searchlights at the Memorial coliseum in Los Angeles during a victory celebration honouring Generals George S. Patton, Jr. and James Doolittle on June 9, 1945

the conversion from war production to peacetime manufacture, more than 8,000 industrial firms employed approximately 234,900 workers. Industrial expansion in Los Angeles was a healthy indication of further peacetime growth. Between 1941 and 1945 the capital investment in Los Angeles industry was increased by almost \$500,000,000, about one-third of it in new plants and two-thirds in the expansion of existing ones, most of which were privately financed.

U.S. department of internal revenue records showed that 12½% of the nation's new businesses after the end of World War II were started in the Los Angeles area. At war's end, 84,000 employers in the Los Angeles area were paying federal social security taxes. At the close of 1946, 123,000 employers were on the social security tax roll.

After 1937 the cost of electrical power to Los Angeles consumers was reduced 30% by the municipally owned and operated water and power department, giving the city the lowest average electrical rate of the ten largest cities in the U.S. The city's major water supply came from melting snows of the eastern Sierras and travelled a distance of 337 mi. from the Mono basin and Owens valley, utilizing 260 mi. of aqueduct and 77 mi. of natural waterways. In 1941 the \$220,000,000 metropolitan water aqueduct was completed, bringing to Los Angeles water from the Colorado river, which, combined with existing water facilities, ensured a water supply for the future needs of at least 10,000,000 persons and further industrial expansion. This water was pumped over mountain ranges with power generated at Boulder dam and was conditioned for domestic use by one of the largest water-softening plants in the

world. An eight-year program of additions and improvements for the city water and power systems was undertaken in 1946 at a total cost of \$124,000,000.

The unprecedented activity in construction and housing development immediately following the war caused Los Angeles to issue more building permits during the first eight months of 1946 than the combined total of the nine other largest cities in the western U.S. This was necessitated by a great increase in population caused by large numbers of industrial workers remaining in the area, the location of veterans and their families from other states, the general influx of persons from other areas and the industrial and commercial growth of the city. Building permits during the first 10½ months of 1946 totalled 47,927, with a combined value of \$206,547,696.

In 1939 the first slum-clearance project was instituted to provide low-cost housing for low-income families. In the following years, nine similar projects were completed at a total cost of \$15,202,233. These ten projects provided housing for 3,468 families previously living in substandard dwellings. In addition, 12,275 housing units were provided during the war for war workers and their families.

Mayor Fletcher Bowron assumed office in 1938 following a recall election, under the provisions of the city charter and state constitution. There followed a city-wide cleanup which included reorganization of police, fire, health, civil service and other city departments.

A revolutionary step in city planning was completed in 1946 with the adoption of a comprehensive zoning ordinance, which was the result of a charter amendment making Los Angeles the first major city in the U.S. with a master plan of future physical development. This comprehensive zoning ordinance had been considered as a model for many large cities. Los Angeles had previously held the distinction of being the first city in the U.S. to put into effect zoning restrictions.

The growth, development and expansion of Los Angeles during the automobile age accounted for the city's extensive limits. It had become a city of automobiles. The 1940 federal census gave Los Angeles a ratio of five automobiles to every four families. In 1940 the first link in a 613-mi. chain of planned freeways was dedicated. With the aid of state and federal funds, existing freeways were extended and new ones were planned. In 1946 the city had a total of 5,502 mi. of improved streets. Between 1937 and 1946, 569 mi. of streets were added. (F. Bow.)

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Lothian, Marquess of

The 11th Marquess of Lothian (Philip Henry Kerr) (1882-1940), British diplomat, was born April 18, 1882, and was educated at the Oratory school, Birmingham, and New college, Oxford. He went to South Africa in 1905, serving in various capacities for the government until 1908, when he became editor of *The State*, a South African publication. He returned to London in 1909 and became editor of the *Round Table* the next year, holding the post until 1916, when he became secretary to Lloyd George, then prime minister. He was made director of United Newspapers, Ltd., in 1921, chancellor of the Duchy of Lancaster in 1931 and parliamentary undersecretary for India

in the same year. In April 1939 he was appointed ambassador to the United States, in which post his principal duty was to obtain all possible assistance for the British in the way of ships, warplanes and munitions. His last speech, read by an associate the night before he died, was a plea for assistance and an assurance that the British, with U.S. help, could successfully combat the axis. He died in Washington, D.C., Dec. 12, 1940.

Louisiana

A west south central state of the United States, Louisiana was admitted to the union in 1812 as the 18th state; popularly known as the "Pelican state," "Creole state" or "Bayou state." Area 48,523 sq.mi., of which 45,177 sq.mi. are land. Population (1940) 2,363,880, of which 1,383,441 or 58.5% were rural and 980,439 or 41.5% urban; 64% native whites, 34.3% Negroes and 1.7% foreign born. On July 1, 1944, the population of the state was estimated at 2,535,385. Capital, Baton Rouge (34,719). Other important cities: New Orleans (494,537), Shreveport (98,167), Monroe (28,309), Alexandria (27,066), Lake Charles (21,207), Lafayette (19,210).

The general assembly did not meet in 1937, and no important constitutional changes were made. Notable progressive movements were: liberalization of the state's attitude toward industry, resulting in expenditure of \$50,000,000 in construction of new manufacturing establishments and expansion of existing ones; development of an elaborate social security program; improvement in transportation facilities; extension of the rural electrification system; enlargement of the soil-conservation program; and large expenditures on public improvements by the state and its municipalities. Principal state officers were Richard W. Leche, governor; Earl K. Long, lieutenant governor; E. A. Conway, secretary of state; A. P. Tugwell, treasurer; L. B. Baynard, auditor; G. L. Porterie, attorney general; T. H. Harris, superintendent of education.

In 1938, the general assembly met in regular biennial session and passed 431 acts, including 28 proposed constitutional amendments which were ratified at the Nov. 1938 election. Most of the legislation was remedial in character, clarifying and liberalizing certain provisions of the existing code and statutes. More liberal provisions were made for expansion and maintenance of state-supported educational and charitable institutions and several additional trade schools were established. Perhaps the most important act passed was the Public Welfare Revenue act, levying a 1% sales tax for the support of the social security program.

On June 26, 1939, Governor R. W. Leche resigned and

State guardsmen were called out Oct. 9, 1943, in Louisiana to seat a sheriff in Plaquemines parish when the sheriff's foes denied the legality of his appointment. The guardsmen are shown here removing a highway barricade

was succeeded by Lieutenant Governor Earl K. Long, brother of the late Huey P. Long; and shortly thereafter a series of public scandals were revealed, involving the president and certain business officers of the state university, several building contractors and numerous politicians high in the councils of the state administration. The charges included diversion, misuse and embezzlement of public funds, forgery, use of the mails to defraud and other violations. Several of the malefactors were sentenced to state or federal prison terms.

These scandals provided the chief issue in the state Democratic primary of Jan. 16, 1940. In the hotly contested campaign, Governor Long led the administration machine forces, while the other four gubernatorial candidates ran upon reform platforms. The first primary was indecisive and a second was held on Feb. 20, 1940, in which Sam Houston Jones defeated Earl K. Long for governor and the Long machine which had dominated state politics for 12 years was overthrown. A comprehensive program of reform legislation was enacted, designed to eliminate political graft and corruption, ensure economy and efficiency in the public service and prevent any recurrence of political dictatorship or public scandal. The chief reform acts provided for a reorganized state administrative system, centralizing authority and responsibility in a few key officials and boards; a revised state fiscal system; the elimination of recognized abuses in the electoral system; a state civil service system to end political jobbery and ensure efficiency; a revised state tax structure, repealing the sales tax and increasing taxation on those citizens and corporations most able to bear it; the creation of a crime commission with power to deal with peculation in the handling of public funds; and the clarification of certain sections of the civil code and code of practice.

In 1941 the ousted Long faction attacked the constitutionality of much of the reform legislation enacted in 1940, and attempted to halt the investigation of political scandals. The state supreme court upheld some of the reform measures and invalidated others. The national defense program accounted for much of the construction work in the state in 1941. Existing army training camps were enlarged, several new ones were constructed, and new airfields were established. Industrial plants engaged in defense production were expanded, and additional ones were built. From August to October, 500,000 soldiers participated in elaborate military manoeuvres in Louisiana. Work was begun on an oil pipe line from Baton Rouge to the Atlantic seaboard, as a phase of the defense program.

In 1942, the legislature met in regular session on May 11. Because revenues had fallen below budget requests,





Governor Jones urged economy and recommended either drastic reductions in appropriations or new taxes to raise additional funds. The legislature adjourned after passing an appropriation bill calling for expenditures greatly in excess of revenues, without enacting new tax measures. The governor thereupon vetoed enough items to balance the budget, and after much contention an extra session of the legislature was convened (Aug. 20-29) to provide additional revenues to meet the state's most pressing financial needs, and pass a 1% "War Emergency Sales tax." The most important act passed during the regular session was the new Louisiana criminal code.

The new state civil service system went into operation

on Jan. 1, 1943, after the supreme court had upheld its constitutionality. A program of economy and efficiency in state affairs was continued, in spite of political opposition in the form of several court actions initiated to test the legality of certain reform statutes and administrative policies. The war effort brought increased industrial activity to the state in 1943, and housing facilities were greatly expanded near the chief industrial centres and the military training camps.

Two Democratic primaries were required in 1944, before conclusive majorities were obtained. The Democratic

nominees were formally elected on April 18, though nomination by that party is equivalent to election, and the "reform" wing of the party continued in power. The new state officers were James Houston Davis, governor; J. Emile Verret, lieutenant governor; Wade O. Martin, Jr., secretary of state; A. P. Tugwell, treasurer; L. B. Baynard, auditor; Fred S. LeBlanc, attorney general; John E. Cox, superintendent of education; Lucile May Grace, register of land office; Harry D. Wilson, commissioner of agriculture and immigration.

The 1944 regular session of the general assembly convened on May 8, and next day the new state officers were inaugurated for four-year terms. The only major administration measure rejected by the lawmakers was the proposed 1% sales tax designed to raise \$30,000,000 for postwar improvements. Appropriations for public education were substantially increased, and funds were provided for financing all state institutions and activities during the succeeding biennium. Minor changes were made in the state legal codes, and the civil service system was extended. There were 21 proposed constitutional amendments submitted to the electorate, 16 of which were approved at the general election in Nov. 1944. Roosevelt received 281,564 votes, Dewey 67,750.

A special session of the general assembly was held Oct. 11-21, 1945, to consider postwar problems. The session appropriated \$16,500,000 from the surplus fund to match anticipated federal grants for highways and drainage.

Louisiana: Statistical Data

Table I.—Education (Public)

	1938	1941	1942	1943	1944	1945
Elementary school pupils	374,203	370,000	224,637	227,406	221,461	223,882
High school pupils	86,743	98,000	98,594	96,928	89,687	84,514
Elementary teachers	10,120					
High school teachers	3,881	14,900	11,685	11,475	11,156	11,068

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1943	1944	1945
Number of cases on general relief	8,182	9,674	12,677	4,600		
Cost of general relief	\$111	\$141	\$195			
Recipients of old-age pensions	28,251	31,882	36,099	37,000		36,200
Dependent children receiving aid	28,034	36,575	39,658		39,000	23,620
Blind receiving aid	751	1,067	1,260	1,400	2,260	1,370
Workers under unemployment compensation	245,787	253,600				

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1941	1942	1943	1944	1945
Highway mileage	17,819	18,222	18,000	18,200	18,200	18,200	18,200
Expenditure on highways	\$25,143	\$24,956	\$25,000	\$33,000	\$12,000	\$16,500	\$17,500
Railroad mileage	4,499	4,222	4,500	4,400	4,400	4,400	4,400

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1940	1942	1944	1945
State revenue	\$78,199	\$96,830			\$113,542	\$115,000
State expenditure	\$67,248	\$67,184			\$106,732	\$107,000
Number of banks	146	146	145	146	148	149
Total bank deposits	\$419,000	\$504,800	\$543,700	\$635,000	\$1,230,000	\$1,470,000
Number of national banks	30	29	29	29	31	31

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1944	1945
Acreage, principal crops	4,479	4,188	4,155	4,124	3,800	3,624
Income from crops and livestock	\$124,300	\$112,472	\$92,568	\$225,000	\$265,000	\$270,000
Leading crops (bu.)						
Corn	24,885	23,325	24,128	24,412	18,870	23,140
Cotton (bales)	1,104	745	456	593	620	395
Hay (tons)	321	406	438	393	388	400
Oats	1,395	1,664	1,984	3,150	5,600	4,880
Peanuts (lb.)	6,000	6,110	5,580	8,840	2,480	1,785
Pecans (lb.)	5,185	4,104	4,514	6,400	14,400	9,200
Potatoes, sweet	6,570	6,935	4,988	5,808	8,100	10,724
Potatoes, white	2,728	2,106	2,280	2,520	3,498	2,520
Rice	20,680	21,120	18,040	25,758	21,318	23,028
Sugar cane (tons)	5,258	5,069	2,925	4,935	5,349	6,044

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1942	1944	1945
Wage earners	76,057	71,218	125,000	150,000	150,000
Wages paid	\$60,203	\$55,084	\$150,000	\$200,000	\$200,000
Value of products	\$580,840	\$565,265	\$992,000	\$1,200,000	\$1,100,000

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940	1943	1945
Total value of production	\$182,119	\$172,307	\$168,903	\$190,757	\$260,000	\$275,000
Leading products						
Petroleum	110,300	110,100	98,000	103,961		
Natural gas	53,908	47,991	53,835	71,928		
Natural gasoline	4,300	3,026	3,329	3,857		
Salt	2,899	2,775	2,830	2,804		
Sand and gravel	1,250	1,241	1,195			
Sulphur	7,705		6,761	8,207		

Mardi Gras enjoyed a spirited revival in New Orleans, La., in 1946; the annual festivities had been discontinued since 1941. Figures represent the demon and the king in a Zulu parade

The most important political event of 1946 was the defeat of Robert S. Maestri for re-election as mayor of New Orleans, thus retiring the last prominent leader of the old Huey P. Long political machine. (W. Pr.; X.)

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Love, Nancy Harkness

Mrs. Love (1914–), U.S. aviatrix, was born Feb. 14, 1914, in Houghton, Mich. She learned to fly when she was 16 years old, and while a student at Vassar from 1931 to 1934 she qualified for a commercial pilot's licence. An air-marking pilot for the U.S. bureau of air commerce from 1935 to 1937, she later became a test pilot, and in 1941 she joined her husband's aviation company as sales director. In 1942 it was decided to establish a unit of women fliers to ferry army planes from factories to airfields, thus relieving male pilots for other duties. The unit, known as the Women's Auxiliary Ferrying Squadron (WAFS), was put under command of Mrs. Love. During the summer of 1943 the WAFS was incorporated in the Women's Airforce Service Pilots (WASP).

Lowden, Frank Orren

Lowden (1861–1943), U.S. politician, was born Jan. 26, 1861, at Sunrise City, Minn. Graduated from Iowa State university in 1885, he later practiced law and entered national politics, serving in congress from 1906 to 1911. He was governor of Illinois from 1917 to 1921. Known as a "favourite son" in midwest Republican circles, he was regarded as the outstanding G.O.P. candidate for president at the Chicago convention in 1920, but lost to Warren G. Harding, a "dark horse" after an 11th hour switch in votes. He declined the nomination as vice-president and running mate to Calvin Coolidge in 1924 and withdrew as Republican presidential candidate in 1928 when his farm plank for the party platform was rejected. He died in Tucson, Ariz., March 20, 1943.

Lozovsky, Solomon Abramovich

Lozovsky (pseudonym of A. S. Dridso), Russian politician (1878–), became an active revolutionary in 1900. After organizing Social-Democratic party clubs among railroad workers, he was arrested and sentenced to exile in Siberia in 1908, but escaped and lived abroad until the outbreak of the revolution in 1917. He then returned to the U.S.S.R. and devoted his energies to the organization of the Russian and the international trade union movements. In June 1939 Lozovsky was appointed vice-commissar for foreign affairs.

Luce, Clare Boothe

Mrs. Luce (1903–), U.S. playwright and politician, was born in New York city on April 10, 1903. She was graduated in 1917 from St. Mary's school at Garden City, Long Island, N.Y., and in 1919 from Miss Mason's Castle school at Tarrytown-on-the-Hudson. She was associate editor of *Vogue* in 1930, and associate editor and managing editor of *Vanity Fair* from 1930 to 1934. In 1935 she married Henry R. Luce, magazine publisher. Following a colourful campaign in the 4th district of Connecticut (Greenwich) in 1942, she was elected to the U.S. house of representatives on the Republican ticket. A member of the house military affairs committee and an outspoken critic of the Roosevelt administration, Mrs. Luce was at first op-

posed to American participation in World War II. Before the November elections of Nov. 1944, President Roosevelt personally called for her defeat, but she was re-elected to the house by a close margin. In Feb. 1946 she was converted to the Roman Catholic Church. Shortly thereafter she announced that she would not run for re-election to Congress. Mrs. Luce wrote *Stuffed Shirts* (1933) and *Europe in the Spring* (1940), and several plays, including *The Women* (1937), *Kiss the Boys Goodbye* (1938) and *Margin for Error* (1939).

Lucerne

See ALFALFA.

Lumber

The U.S. lumber industry passed through several critical changes during the decade 1937–46, from a period of business depression and lack of demand to a period of extreme activity, strong demand, and many difficulties incident to the war years. Lumber production in 1937 was about 26,000,000,000 bd.ft. This was considerably above the low production of the depression years (about 10,000,000,000 bd.ft. in 1932) and still far below the maximum all-time production of about 45,000,000,000 bd.ft. in 1909. For several years following 1937, there was a gradual rise in lumber production until 1943, when about 34,000,000,000 bd.ft. were produced. During the years 1944–46, although the demand for lumber for war purposes was extremely urgent, production gradually decreased because of (1) difficulties in securing logging and sawmill equipment, particularly tires, trucks and sawmill parts, (2) scarcity and high cost of labour, particularly of the efficient and skilled types and (3) price ceilings imposed by the government.

The principal lumber species produced during the ten-year period continued substantially the same; that is, southern pine maintained its position as the leading kind of lumber produced, followed in order of importance by Douglas fir, as produced largely in Oregon and Washington, ponderosa pine, produced principally in Oregon, California and Idaho, followed by oak, white pine (including northern white pine and western or Idaho white pine), hemlock (including eastern and western varieties), spruce, sugar pine, redwood and cypress.

The leading hardwoods produced in order of importance were oak, red gum, yellow poplar, maple, tupelo gum, beech, cottonwood, birch, hickory and elm. Basswood, ash, sycamore and walnut were other important hardwoods produced. Important softwoods other than those mentioned above were larch, cedar (including western red, Port Orford and incense cedars), lodgepole pine and balsam fir. About 15% to 20% of the total lumber production consisted of hardwoods.

Lumber production was definitely curtailed by the imposition of price ceilings for logs, as well as for lumber as sold at the sawmills by the manufacturers and retailers of lumber. It was patently evident that lumber could not be produced in large and increasing volume to sell at some of the fixed ceiling prices, especially for certain items and therefore lumber production fell off rapidly. This condition was a natural result of increased wages (decreasing the margin between costs and sales returns), lack of labour caused by strikes, and inefficiency of labour, which became a widespread condition. During 1946, lumber stocks in the retail lumber yards were reduced to as low as 3% to 10% compared with the normal inventories. This accumulated shortage resulted in a serious housing situation.

Various official and expert viewpoints were expressed regarding methods of increasing lumber production both for

war requirements and for the urgent housing requirements after the end of the war in 1945. There was a large sawmill capacity, estimated at about 35,000 mills in the United States, and large supplies of standing timber were available. However, the available product of U.S. forests in the form of finished and seasoned lumber was insufficient to meet industrial requirements, as well as for dwelling construction.

Available timber supplies of the country at the end of the decade were estimated at about 1,162,000,000,000 bd.ft. of standing timber, mostly in the northwest, especially Douglas fir, west coast hemlock, ponderosa pine, several cedars, Sitka spruce, redwood, western white pine and the true firs. Although a large part of the standing timber was in the northwest, more lumber was produced in the eastern and southern states than in the western states. The southern pine forests, comprising about 40% of the total forest area of the country, were growing rapidly, and about 90% of the total lumber produced from southern pine came from second growth or regrowth.

Lumber prices did not reach the extremely high levels during the ten-year period that they did in 1920 following World War I, owing largely to price ceilings established by the OPA. For a typical year, 1943, the average price per 1,000 bd.ft. f.o.b. sawmills, of all lumber in various grades and sizes, was \$36.86. The average price of all softwoods, f.o.b. sawmills, was \$35.57 and the average price of hardwoods was \$41.57. The most valuable hardwood was walnut, followed in order of value by birch, maple, basswood, ash, yellow poplar and oak. Species of comparatively lower values were red gum, tupelo gum, cottonwood, chestnut, beech and alder. The highest value softwoods were, in order of value, Port Orford cedar, western red cedar, cypress, Sitka spruce, redwood and sugar pine. These were followed in value by northern white pine, ponderosa pine and southern pine. Still less valuable woods were Douglas fir, larch, Engelmann spruce, incense cedar and hemlock.

Sawmills cutting from 1,000,000 up to 50,000,000 bd.ft. or more per year produced a very large share of all lumber. The largest number of sawmills produced from 10,000 to 500,000 bd.ft. per year. However, some of the largest sawmills produced as much as 1,000,000 bd.ft. per day each, and the small mills produced only from 1,000 to about 10,000 bd.ft. per day. Many of the sawmills operated only a few days, weeks or months per year. In one year (1943) there were 36,000 active sawmills in the eastern states. Of these, 10,110 mills each cut less than 50,000 bd.ft. of lumber in one year, and altogether produced only 1% of all the lumber sawed in the eastern states. The very largest sawmills were located in Oregon with a few others of enormous daily and annual capacity in Washington, California and Idaho. The number of active mills in the western states was reported to be 2,757.

The U.S. Industry and War.—During the period 1941–45 inclusive, there was a preponderance of production for the war effort, especially for boxes and crates in which to ship enormous quantities of food, munitions and supplies, lumber for building purposes, aeroplanes, docks, barracks and structures of all kinds in army camps, shipping ports, and training centres and for repair work. Considerable lumber was shipped abroad for the army. About 60,000,000 bd.ft. were shipped to the port of Naples, Italy, alone for dock repairs. Because of war priorities, very little lumber was available for normal domestic uses.

Lumber was generally taken rough and green (unseasoned) from the sawmills, contrary to the normal and best recommended practices. Also, green lumber was often

planed without prior seasoning, which is also regarded as poor practice. This was a reflection of the extreme urgency of the demand for lumber.

Wages increased for both woods and sawmill labour. This condition was reflected in decreased efficiency and considerable unrest leading to strikes and shutdowns, often as a result of labour jurisdictional disputes. For example, woods labour under C.I.O. (Congress of Industrial Organizations) jurisdiction would sometimes refuse to furnish logs to sawmills which were organized under the A.F.L. (American Federation of Labor). There was an increasing use of labour-saving devices, a direct result of the demands for higher wages and the difficulty of securing efficient, adequately trained and sufficiently skilled labour.

A gradual reduction of normal sawmill output took place because of the labour scarcity, the difficulties in securing proper machinery and repair parts and especially sufficient tires and trucks for normal production. These conditions, combined with the ceiling prices of the Office of Price Administration, seriously curtailed lumber production until it reached a low of about 27,000,000,000 bd.ft. in 1945.

Lack of lumber for civilian housing or for normal industrial requirements continued. The curtailment of lumber for civilian purposes prevented normal housing construction, resulting in a serious shortage for housing returning veterans as well as for the normal population increases. Generally about 800,000 frame dwellings had been erected annually under normal conditions. For about five years, very little construction of this kind had been done. The result was a critical housing shortage.

The whole decade was also marked by a gradual reduction of the enormous wastage incident to converting round logs into lumber, especially in the form of sawdust, shavings, edgings, trimmings, etc. Many new methods were developed for using this material in the manufacture of pre-sto-logs for fuel, various plastics, fibreboards, wood flour, and materials for linoleum and other floor coverings. The reduction of sawmill waste was an outstanding accomplishment. Normally less than 50% of the trees felled during logging operations had been found in the final lumber product.

The period was also marked by a further development in more accurately finished sizes and precision planing in connection with grade and trade marking throughout the industry for better identification of grades, species and sawmills of origin.

Trends of the Industry.—During the decade, there were three significant changes in the economic structure of the lumber industry. There was, for example, a definite and changing attitude among lumber manufacturers to make a much more improved and attractive product for the ultimate consumer. This definitely resulted in close and more complete utilization of the enormous wastage incident to the conversion of round logs as found in U.S. forests to the finished sizes and forms used by the ultimate consumer. Large quantities of sawmill refuse formerly wasted were used for paper pulp, fibreboards, plastics and floor coverings.

At the same time, there was a very active, progressive and forward-looking program of forestry. Although lumbermen still owned a relatively small part of the remaining timber resources in this country, private owners, including lumbermen, farmers, railroads, miscellaneous corporations, pulp and paper companies, etc., owned or controlled about 80% of the total remaining areas of forests. The

organized lumbermen, through the American Forest Products industries, devoted considerable attention as well as funds to promote: (1) better and more adequate fire protection to assist in the regrowth of cut-over forests, as well as the protection of the existing stands; (2) the reforestation of many thousands of acres and the advocacy of planting by farmers, lumbermen and other private owners throughout the country; this revolved largely around their program entitled "Trees for America," also locally known as "Trees for Tomorrow"; (3) cutting the forests by silvicultural methods to assure the increased growth and productivity of trees remaining and the continuity of forest management. Thus the growing capacity of forests by a system known as selective logging was increased and stimulated, rather than impaired.

There was a growing feeling that the United States would need more of its resources for lumber, pulp and paper, and many other forest products and that exports to foreign countries should not be increased. If U.S. forests were properly protected and managed, it was believed that an adequate supply could be grown for all domestic requirements and perhaps in addition, a profitable export trade. However, the prospective demand for the postwar years appeared to be very large, to make up for the housing deficiency from 1941 to 1946. An exceedingly strong demand for all kinds of lumber was anticipated, not only for housing, but for industrial purposes, railroads, farm construction, and many other purposes for which lumber had been demonstrated to be the most useful material.

Mechanized Logging.—A notable development in the lumber industry during the latter years of the ten-year period was mechanized logging. The difficulty in securing sufficiently skilled labour combined with work stoppages during strikes caused the introduction and use of mechanical means of falling and crosscutting trees into log lengths as well as for skidding the logs to landings in the woods and hauling the logs to sawmills. The practical achievements in mechanized logging may be summarized as follows:

(1) Improved tractors for skidding logs from the felling areas in the woods to central loading points known as landings. During the war tractors were developed to a much greater state of efficiency and replaced horses, mules and oxen almost entirely in U.S. forests.

(2) Improved log loading devices. Formerly, logs were frequently rolled by hand from skidways onto trucks or railroad cars. Many improved devices using an A-frame or overhead cable and a small tractor for power were used to elevate logs from the landings onto motor trucks.

(3) The use of chain saws for falling trees and bucking them into log lengths. About ten different makes appeared on the market during 1937-46. After falling the trees in the woods, the long or tree lengths were skidded to a central landing or skidway, then cross cut into 10, 12, 14 and 16 ft. lengths in the east and south or to much longer lengths as commonly used on the west coast. These chain saws were developed for use in falling large timber up to 6 to 8 ft. in diameter on the west coast and smaller types for falling and bucking pulpwood as well as saw timber in Canada, the northeast and in the south.

(4) The use of trucks to haul logs to sawmills. Trucks replaced many other means of transporting logs from the woods to the sawmill, such as railroads and water transportation. By increasing the size and number of tires, large axles and brakes, logs were brought from the woods to the mills much more promptly and more cheaply than by other means. Some of these trucks were equipped with a power take-off so that the motor engine could be used to elevate the logs and draw them onto the trucks in addition to its ordinary use. (N. C. B.)

Great Britain, the Commonwealth and Europe.—The years 1937-46 showed a transition in the supply of timber from plenty to scarcity. In 1937, certain international

trade agreements were made with the object of relating production to demand and thus ensuring a fair return to the producers. In fact, the glut of timber caused the organization of European exporters, known as European Timber Exporters convention, to take steps to limit the quantity of European softwoods available for export, whereas in 1946 one of the main problems of reconstruction in Great Britain, the commonwealth and Europe, was a comparative shortage of timber at the places of consumption.

Position Before World War II.—The quantity of timber which the U.S.S.R. wished to export was an embarrassment to its neighbours. It did, however, become a party to the E.T.E.C. agreement. After several attempts to handle the Russian exports, the softwood importers of Great Britain in 1930 established the Central Softwood Buying Corporation, Ltd., and in 1932 established the Timber Distributors, Ltd., to negotiate on their behalf with exporters for the soviet union and the resultant purchases were divided among the individual importers. Production in the principal European hardwoods, viz., oak, ash and beech, was on the heavy side, but the importing markets were able to absorb it without any serious dislocation. A considerable overproduction in plywood took place, however, in the principal European exporting countries. This was assisted by the fact that the German government was subsidizing its industry so that German plywood was actually selling considerably cheaper in the importing countries than it was in Germany itself. In 1936, currency problems were already troubling many of the European countries with the result that limitation of timber imports by the means of quotas was set up in Germany, France, the Netherlands, Belgium, Spain, etc. Canada's export was divided between the U.S.A. and Great Britain and the far east. Canadian softwoods continued to show a steady increase among the import statistics of Great Britain.

Table I.—Timber Production in the British Commonwealth and Europe, 1938

Countries	Softwood	Hardwood	Plywood	Total
Canada	293,396,000 cu.ft.	20,617,000 cu.ft.	10,477,000 super ft.	
U.S.S.R.	10,000,000 standards (est.)		24,340,000 cu.ft. (1940)	8,208,000,000 cu.ft. (est.)
Central and Southern Europe	5,000,000 standards (est.)			
Sweden	1,450,000 standards			850,000,000 cu.ft. (est.)
Finland	1,300,000 standards of sawn goods			
Baltic States	1,000,000 standards (est.)			

World War II.—The outbreak of World War II changed the timber position overnight. The great exporting countries were cut off from all contacts with their principal buyers. Great Britain, the largest timber importing country, was forced to draw the whole of its supplies from the U.S.A., and from Canada and other parts of the commonwealth. Such exports as were still possible from Sweden and Finland went to Germany. Poland was mainly overrun by invading armies, and the soviet union ceased to export, using its timber production for internal purposes. Southeast Europe continued a small export trade to Great Britain for a few months, but this was cut off on the entrance of Italy into the war. On Sept. 1, 1939, the United Kingdom timber control was established and immediately produced a maximum price list for all timbers, including plywood; no consumer could obtain material without a licence, which was granted only for essential work. At the same time the government took over all existing forward contracts and the timber control became the sole buyer for Great Britain.

A timber control office was set up in Canada in 1940 to

control both internal prices and exports. A definite quota based on production was allocated to Great Britain and continued in operation throughout World War II. In addition, maximum prices were established by 1943. The timber controls of both Great Britain and Canada operated efficiently. The need for them was well appreciated by producers, merchants and consumers alike. In 1941, passage of the Lend-Lease act by congress introduced an additional factor into the timber operations of both Great Britain and Canada. The dollar reserve in Great Britain had by now fallen to such a low level that without this U.S. assistance it would have been virtually impossible for Great Britain to maintain the necessary imports of vital raw materials for its war effort. Contact between both the British and the Canadian timber controls was maintained through the agency of the lend-lease administration. After the victory in Europe this business was transferred to the Foreign Economic Administration. After the complete cessation of hostilities, the Office of International Trade in the U.S. took over the task. During World War II the actual operative body was the allocations committee of the War Production board.

On the cessation of hostilities, the demand for timber for reconstruction purposes in both Europe and Great Britain remained very large, while supplies were still short. A body known as the Allied working group was established with headquarters in London to apportion the available supplies equitably among the Allies, according to their needs.

In 1942, the German submarine campaign took such toll of Allied shipping that the amount of shipping for importing timber became seriously restricted. It became urgently necessary to increase British home-grown supplies and, in consequence, the home-grown timber production department of the ministry of supply was started. This department not only encouraged production by merchants to the fullest possible extent, but also operated mills of its own.

The quantity of timber saved in importation from 1939 to 1945 as a result of the home timber production was the equivalent of 19,600,000 short tons. The home timber industry bridged the gap in the timber supply situation. Whereas 95% of the prewar consumption of timber was imported, the consumption of home timber rose to a peak of 44% in softwoods and 80% in hardwoods during World War II.

Table II.—Timber Production in Great Britain, 1935-43
(United States tons)

	1935-38 average	1939	1940	1941	1942	1943
Hardwood . . .	168,000*	347,200†	555,520	733,600	1,148,000	1,401,120
Softwood . . .	201,600*	134,400†	497,280	785,120	964,320	901,600
Pitwood . . .	134,400*	504,000†	1,710,240	1,613,920	1,762,880	1,976,800

*Production in 1930.

†Estimated production at the beginning of World War II, expressed as an annual rate.

Canada, because of its position outside the immediate scene of the conflict and the fact that it possessed the bulk of the softwood reserves of the British empire, was able to supply the remainder of Great Britain's requirements. In 1944, estimated imports of Canadian wood included about 1,000,000,000 ft. of softwood lumber, 18,000,000 ft. of Sitka spruce of aircraft quality, 33,600 short tons of birch logs for aircraft veneer, 20,000,000 ft. of graded hardwoods, 80,000,000 ft. of Douglas fir plywood, 175,000,000 ft. of aircraft plywood and huge quantities of board made in the pulp and paper mills. In 1942 annual exports to Great Britain reached a figure between 15,000,000 and 20,000,000 ft.

Canadian production held largely to its previous scale. The logging and export of western hemlock tended to in-

crease as more experience was gained in the conditioning, both by air seasoning and kilning, of this useful timber. During World War II, large quantities of it were milled in the more northerly territories, from which it was exported under the name of Alaska pine. In regard to operations in eastern Canada, an attempt was set up to put the production of maritime spruce on a more satisfactory basis by introducing better grading methods. A committee of the maritime lumber bureau was in negotiation with British importers on this matter. The Canadian plywood industry made rapid strides and several new undertakings were started. There was a large demand from the British ministry of aircraft production for specially selected aero grade birch plywood for the aircraft industry. A large new mill was established in eastern Canada, principally for the manufacture of birch plywood.

The difficulty of obtaining hardwoods during the years 1940-45 induced a fresh investigation into the possibilities of using subsidiary timbers from the British colonies in West Africa. Several little known woods were introduced on the English market with good results,* notably ekhimi or dahoma (*piptadenia africana*), a heavy wood of a golden brown colour used for constructional purposes; danta (*cistanthera papaverifera*), a reddish wood of a mahogany nature from the Gold Coast, and idigbo (*terminalia ivorensis*), a medium weight wood with something of the texture of ash which was largely used for vehicle construction and similar purposes, were also introduced.

Postwar Position.—On the cessation of hostilities, an enormous demand for timber of all description arose for the purposes of reconstruction in both Europe and Great Britain. To plan the orderly distribution of the limited supplies available in a fair manner among consumer countries, the Allies set up the timber subcommittee of the emergency economic committee for Europe. The position was somewhat eased in that Sweden was able to resume exports to its old markets in Great Britain, the Netherlands, France, Belgium, etc. A substantial quantity of the Finnish wood production was taken by the U.S.S.R. for reparations, but at the same time Finland was able to resume exports to its old customers in a small way. The production of Rumania and Yugoslavia was either used for internal purposes or transferred to Russia. Czechoslovakia resumed production, most of which was required for internal purposes, but a small export was made to Great Britain. Poland did not resume its exports, and Estonia, Latvia and Lithuania, which were substantial prewar exporting countries, had been absorbed in the soviet union, whose timber production was apparently absorbed by internal consumption. Negotiations were, however, successfully concluded in 1946 to provide for a quantity of Russian softwoods to become available for export in exchange for manufactured goods.

A large proportion of the variation in prices during 1937-46 was due to a heavy increase in freight charges.

Table III.—Variation in Prices, 1938 and 1946
(United Kingdom import statistics of the board of trade)

	1938	1946 (approximate)
Hardwoods: hewn	3s.7d. per cu.ft.	5s.9d. per cu.ft.
sawn	3s.9d. per cu.ft.	8s.3d. per cu.ft.
Softwoods: sawn	£13.6s.0d. per standard	£38.15s.0d. per standard
planed	£15.8s.0d. per standard	£40.14s.0d. per standard
Plywood	6s.0d. per cu.ft.	15s.0d. per cu.ft.

In Canada early in 1946, the maximum price list for export goods was lifted, but Great Britain still had its quota allocation on long-term contracts; the Canadian govern-

ment maintained control of the domestic price level. The United Kingdom timber control remained in force in 1946, although there had been some modification of arrangements for the softwood trade, by which importers bought their stocks from the timber control at the ports. The government, however, still remained practically the sole buyer in all branches. Licensing was still extremely severe, timber being available only for essential purposes.

Research and Development.—The years 1937–46 were a period of extensive research and development in the scientific utilization of timber. Important advances were made in the promotion of new uses and the improvement of existing uses; the practical application of research also resulted in the exploitation, particularly for the common war effort, of inherent qualities of woods which were formerly untested. This was evident in the manufacture of plywood and veneers; constructional timber fabrication; kiln and electric drying and the stress-grading of timber.

The uses of synthetic resin glues were considerably extended in the manufacture of waterproof and heat-resisting plywood. The glue line became in fact stronger than the materials which it bound together. These glues were already in use before World War II, but the demands of the aircraft industry in particular greatly extended their uses, with results that could be applied for civilian purposes. The use of synthetic resin glues was not confined to their properties as an adhesive; wood was impregnated with the glue under pressure to form a strong, hard and durable material, widely used during World War II in aeroplane propellers, as well as for many other purposes, including special bolts and nuts, hinges, etc. Postwar uses included gear and pulley wheels, bearings, shuttles, bobbins, electrical insulators, etc. For many years scientists had endeavoured to find ways of reducing the shrinkage and swelling of timber caused by its inherent hygroscopicity. Important steps toward solving this problem were taken. Here again synthetic resins and also heat treatment were used. A considerable development took place in the fabrication of wood for use in the laminated construction of roofs to cover large areas without the disadvantage of intervening pillars.

The technique of the kiln drying of timber progressed steadily. Besides traditional methods of heat and steam, systems were devised for improving and speeding the drying of timber by chemical means, using urea. As a result of experiments in the United States, the Timber Development association inaugurated a series of experiments in Great Britain with fairly satisfactory results. Electricity was also used for the drying of timber; this process, known as the high frequency method, involved passing a powerful electric current through the wood, thus generating heat and so drying the wood. The object of all these experiments was to reduce the time taken to dry timber from a green state to that in which it would stand without shrinking and warping.

Another important advance was the development of stress-grading of timber, a method of grading by which every piece of timber with certain characteristics was known to come within a definite range of strength properties. It differed from the ordinary grading in that, with the latter, defects allowed were purely arbitrary and based largely on appearance. In the case of stress-grading thousands of official tests enabled scientists to correlate the visual characteristics of a piece of timber with its actual strength in use. By this means timber took its rightful place with steel, concrete, etc., as an engineering material.

The shortage of all classes of building materials once more drew attention to the value of timber as a housing material. Some notable advances in design were made. In this respect the use of prefabrication was brought into great prominence by the use of exterior grade plywood. As a result of experience achieved by aeroplane manufacturers in Great Britain, modern design houses were being built there in 1946. Prefabricated Swedish timber houses were also being erected by local authorities under the auspices of the ministry of health.

United Nations and F.A.O.—The Food and Agriculture organization of the United Nations was set up to cover agriculture, forestry, food and fisheries. The forestry division was divided into two groups, (1) forestry and (2) forest products and utilization. The method of administration planned was by a series of annual conferences of delegations from the various nations, which would reach decisions on policy, approve programs of work and issue general instructions. The function of the director of the forestry division, under the director general of the F.A.O., would be to carry out the instructions given by such annual conferences. One of the immediate tasks was to make a survey of many large forest areas which hitherto had been considered difficult of access owing to lack of transport facilities, etc. Modern practice would enable such forests to be utilized. In order to avoid the wholesale cutting of timber which had happened in many places in the past, it was intended to bring such new forests under management from the outset. It was estimated that the world's forest area covered some 8,000,000,000 ac., of which only 3,000,000,000 ac. were being used. (See also FORESTS.)

(B. L.; H. G. Do.)

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Lutherans

In 1946, the structural organization of the Lutheran Church in North America was practically the same as it was in 1937, but in relationships between the 17 independent bodies great progress was made toward one Lutheran Church organization in America. The National Lutheran council was founded in 1918 as an agency for co-operation in work in which all Lutherans recognized a joint responsibility. In 1944 a new constitution for the National Lutheran council was adopted by two-thirds of the Lutherans in the U.S., under which the forces of the participating bodies were so united as to make a solid working front in many major areas of service. In 1946, a parallel constitution was adopted for a council in Canada, to operate with greater freedom in matters of a national character.

In 1946, also, three of the larger bodies approved the undertaking for the preparation and publication of a common hymnal, to replace those hymnals which hitherto had strongly reflected the traditions of European hymnals. In the same connection preliminary steps were taken to prepare a liturgy for use in all Lutheran congregations.

In 1936, the total confirmed membership of the Lutheran churches in North America had been reported as 3,194,304, representing an estimated constituency of 8,000,000. In 1946, the confirmed membership was 3,877,657, representing an estimated constituency of 8,500,000. It was estimated, on the basis of census reports, that there were not less than 3,000,000 Lutherans in North America outside of reporting congregations.

In 1946, Lutherans in North America were supporting 23 theological seminaries, 65 colleges, 80 hospitals, 27 child-

caring agencies, 105 homes for the aged, and 41 area societies for the ministry of mercy. No notable additions in numbers were made to these institutions in the ten-year period, 1937 to 1946, but great expansion in facilities and service took place.

The great service to men and women in the armed forces during World War II, costing more than \$2,760,000, was projected to care for thousands of G.I.'s who had entered educational institutions, and to other thousands in hospitals for veterans. In 1946, these services to be continued for men and women from the armed forces required a budget of \$300,000.

When World War II broke out, the Lutheran churches in North America assumed the responsibility for the care of scores of "orphaned missions" in many countries—India, Africa, Syria, Palestine, New Guinea, Greece, China, Japan, Madagascar, Arabia. The churches in the U.S. contributed \$1,597,579 for this special service. It was recognized that no small part of this work would become a permanent responsibility for the churches.

As soon as channels were opened after the end of the war in Europe, the Lutherans in the U.S. began shipping food and clothing through the Lutheran World Relief, Inc. During 1945 and 1946, more than 3,535,253 lb. of used clothing was gathered and shipped to various countries for distribution as prescribed by the governments involved.

During the war period, the Lutheran churches in North America contributed for special causes more than \$15,000,000, of which \$12,000,000 was for war relief and reconstruction. The total benevolence contributions of these churches for the period 1936 to 1945 was \$98,814,712. The total benevolence contributions for 1946 were just four times those of 1936.

Half of the ten-year period brought disruption, chaos, and destruction for the Lutheran churches in Europe, especially in Germany, Norway, Finland, Denmark and the Baltic states. The church in Sweden was profoundly disturbed and distressed, and was so definitely isolated from the rest of the world that all communications with churches in Europe were impossible.

The census reports for 1939 on Lutheran membership in the church in Europe was given as 56,548,585, a large percentage of all Protestants in the world. In 1946, no estimate of this membership could be made with any assurance, because of losses by death, displacement of whole populations, destruction of property and disorder in organization. Nevertheless, the church withstood the destructive forces of war as no other institution did.

The years 1945 and 1946 were especially "eventful years" for the Lutheran Church in the world, because it was then that the Lutherans of the whole world restored communications and came together, through accredited representatives, for the formation of the Lutheran World federation, as the successor to the loosely organized association, known previously as the Lutheran World convention. The Lutheran World federation, with efficient organization, entered upon a gigantic program of world missions, education and social service, through which it determined to make a major contribution to the welfare and happiness of mankind and to permanent peace in the world.

In recognition of the total task of the whole Christian Church in the world, the Lutherans, in connection with the organization of the Lutheran World federation, took necessary steps also in 1945 and 1946 for participation in the World Council of Churches.

One of the most significant facts concerning the strength and character of the church became apparent in the missions to non-Christian countries. In those countries the

young churches had been dependent, from their beginning, upon foreign material support and upon the leadership of the missionaries. The significant fact is that when deprived of that support they stood the test of loyalty to their faith and devotion to the church to a degree that resembled the church in the days of the apostles. One of the most striking examples of such steadfastness was in the case of the church in Japan, where the church not only continued to function throughout the war, but was ready, at the end of the war, to become one of the greatest reconstruction forces in that country. (W. H. G.)

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Luxembourg

Luxembourg is an independent, sovereign grand duchy in Europe at the point where the frontiers of France, Belgium and Germany come together. Area, 999 sq.mi.; pop. (est. 1942) 301,000 (1935 census 296,913); chief city, Luxembourg (cap. 59,000) (1935 census, 57,740); language, Luxembourgian (idiomatic) and (officially) French and German; religion, 98% Roman Catholic. Ruler after 1919: Grand Duchess Charlotte (b. 1896).

Dupong Government.—In June, 1937, a new government headed by Pierre Dupong of the Catholic party and including for the first time two Socialist ministers, marked a turning-point in Luxembourg's internal policy, as its chief aim was to safeguard above all the social and material needs of all the working classes.

German poster burning in a Luxembourg town as the people welcomed the entrance of Allied troops and the end of German domination in the fall of 1944



When, in 1938, war seemed unavoidable, Foreign Minister Joseph Bech reaffirmed the maintenance of his country's policy of neutrality, based on the London treaty of 1867. The people of the grand duchy celebrated enthusiastically, on April 22, 1939, the centenary of their country's independence, which they felt threatened by Nazi Germany at that very moment. The nation's suspicions were not unjustified, since, on May 10, 1940, German troops invaded the country. During the fights on the southern fringe of Luxembourg, 45,000 Luxembourgers found refuge on the hospitable soil of France. The grand duchess and her government immediately left the country in order to defend Luxembourg's cause in the free world, and by this act the grand duchy entered the war on the side of the Allies as the "Baby Partner."

Occupation.—In spite of the Nazis' reiterated affirmations to respect the territorial integrity and the political independence of Luxembourg (repeated once more on the very day of the country's invasion by their troops), Hitler appointed the German Gustav Simon Gauleiter of Luxembourg, with the object of preparing the forthcoming annexation of the grand duchy to the Reich. The Gauleiter's drastic steps in that direction, hurting the loyalism of the Luxembourg people to their royal house and their innate love of their free country, as well as their traditional admiration for France, originated Luxembourg's stiff resistance to all ruthless and brutal measures. In the course of their unequal struggle against the Nazis, the Luxembourgers manifested their passionate will to independence, which had found expression in their century-old national song: "We Want to Remain What We Are!"

On Oct. 10, 1941, a census was to be taken, in which all adult Luxembourgers were to declare that they were of German racial origin and that their mother tongue was German. But, thanks to their spontaneous opposition, this census turned out a 98% failure and had to be cancelled.

On Aug. 30, 1942, the Gauleiter proclaimed the *de facto* annexation of Luxembourg to the Reich and ordered compulsory military service in the Wehrmacht for several classes of Luxembourg boys. By way of protest, the Luxembourgers, on Aug. 31, declared a general strike, the news of which startled the Allied world and roused great admiration in the free countries all over the world. The Gauleiter retaliated by declaring martial law, which lasted eight days, during the course of which 21 patriots were shot and many others sent to prisons and concentration camps. Deportations of whole Luxembourg families set in, which went on without interruption until the liberation of the country by the Allies.

Meanwhile, the grand duchess, who in Feb. 1941, had been heartily welcomed by President Roosevelt at the White House, and her government had become the spiritual leaders of Luxembourg's resistance to the Nazi aggressor and had succeeded in "putting the grand duchy on the map." They gathered the Luxembourg boys who had managed to escape from the Wehrmacht into a small unit which prepared to fight on the side of the Allies.

Freedom.—Luxembourg was liberated on Sept. 10, 1944, but its ordeals were not yet at an end. The country was to contribute its greatest share to the Allied cause during the Battle of the Ardennes (Dec. 1945–Jan. 1946), in which one-third of its territory was laid waste. The total cost of war for the grand duchy amounted approximately to 16,000,000,000 francs.

After the first parliamentary elections in 1945, Pierre Du-

pong formed a Government of Sacred Union, comprising four ministers belonging to the Christian Social party, two to the Labour party, one to the Groupement Patriotique et Démocratique and one to the Communist party.

Thanks to the generous help granted by the U.S. and Great Britain, Luxembourg gradually recovered after V-E day and started to reconstruct its devastated areas. The Belgian-Luxembourg Economic union founded in 1921 was re-established in 1944. A customs union with the kingdom of the Netherlands was also prepared.

The people of Luxembourg felt highly honoured, when Gen. George S. Patton, their great liberator, was buried in Luxembourg soil in the U.S. military cemetery at Hamm, and when Winston Churchill paid a visit to their country in July 1946.

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Luxembourg: Statistical Data, 1938

Item	Value (000's omitted)	Amount or Number
Exchange rate		
United States		1 franc = 4.2 cents (not quoted)
Great Britain		
Finance		
Govt. revenues	\$14,420 (£2,949)	
Govt. expenditures	\$14,916 (£3,051)	
National debt	\$28,878 (£5,907)	
Transportation		
Railroads		318 mi.
Highways		2,644 "
Communication		
Telephones		15,964
Telegraph lines		796 mi.
Minerals		
Iron		1,661,166 tons
Iron ore		5,666,519 "
Gypsum		21,937 "
Crops		
Root crops (fodder)		517,585 tons
Potatoes		314,817 "
Wheat		54,895 "
Oats		45,856 "
Livestock		
Poultry		554,831*
Cattle		108,512*
Swine		147,366*
Manufactures		
Metal	\$53,651 (£10,974)	...
Exports†		
Imports†		
Defense		
Standing army personnel		495
Military expenditures	\$588 (£120)	
Education		
Primary schools		1,416
Students		46,697
Middle and secondary schools		7
Students		3,031
Normal schools		221
Students		3
Professional and technical schools		934
Students		

*1937.

†Included in figures for Belgium.

Lynching

One of the most significant and encouraging developments in the American social scene during the decade 1937–46 was the progressive decline (except for the last years) of the lynching habit. An all-time low was recorded in 1945, with only a single crime of this character; in 1944, there were only two. The significance of these figures is seen more clearly when placed over against an annual average of 86 victims from 1882 (the first year of accurate records) to 1935 inclusive, 1892 being the peak year with 231 known mob victims.

After that year, many factors contributed to a slow but fairly steady reduction of this type of crime. For progress

in this respect during the decade 1937-46, however, it seemed fair to give major credit to the determined and picturesque anti-lynching campaign carried on by the Association of Southern Women for the Prevention of Lynching. Organized in Atlanta, Ga., in 1931, under the auspices of the (Southern) Commission on Interracial Cooperation, and led by a Texas woman, Mrs. Jessie D. Ames, this association grew rapidly. Soon it reached a membership of more than 40,000 of the south's leading women, representing no less than 85 national, regional and state organizations, religious, literary, civic and political. Every one of these 40,000 women pledged herself by personal signature to do all in her power to prevent mob violence and to create a public opinion that would not condone it for any reason whatever.

Impelled by a sense of obligation to repudiate utterly the claim that lynchings were necessary for the defense of womanhood, these women went zealously about their task in every way possible. They interviewed hosts of public officials, from governors down, and gained the co-operation of more than 1,000 of them. They delivered addresses and conducted programs before hundreds of organizations, and secured their official endorsement. They blanketed the south with anti-lynching posters and literature. In numerous threatening situations they intervened directly, appealing to officials for the protection and fair trial of persons accused. Statistics of lynching testified to the effectiveness of their work.

But, while giving due credit to the efforts of these women, recognition should be extended also to other agencies working to the same end. It should be remembered, for example, that for nearly 30 years, the National Association for the Advancement of Colored People had conducted a continuous anti-lynching campaign, often against hopeless odds. Year after year this organization sought to bring lynchers to the bar of local justice. Meantime it pressed steadily for the enactment of a federal anti-lynching law to strengthen the hand of the government in such cases, though unsuccessfully. These efforts were attended with a great deal of publicity which did much to build public opinion on the subject. The churches contributed greatly to the same end, through vigorous pulpit utterances and official resolutions. To be remembered also were the newspapers of the south, which for a number of years had been practically unanimous in opposition to mob violence.

In spite of these encouraging facts and trends, however, it was pointed out that the friends of law and order should not assume that the fight against lynching was won. Students of the situation recognized that no small measure of mob psychology still persisted in America, north and south, and that for some years to come vigilant efforts would be needed to hold it in check. (R. B. E.)

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Lyons, Joseph Aloysius

Lyons (1879-1939), Australian statesman, was born of a poor Irish immigrant family in Stanley, Tasmania, on Sept. 15, 1879. His education was largely informal. After a period as a school teacher he was elected to the Tasmanian house of assembly in 1909, and was prime minister of Tasmania from 1923 to 1928. He became Australian postmaster-general and minister of public works in 1929. Lyons broke with his fellow ministers in Prime Minister James Scullin's labour cabinet in 1931 and founded the

United Australia party, a strong opposition group which swept Scullin from office. Lyons became prime minister in 1932. Probably the most noteworthy accomplishment of his three successive terms was his reorganization of Australian finances. Lyons visited the United States in 1935 and represented Australia at the coronation of King George VI in 1937. He died at Sydney on April 7, 1939.

Lyttelton, Oliver

Lyttelton (1893-), British government official, was educated at Eton and at Trinity college, Cambridge. During World War I he served as an officer with the grenadier guards and was awarded the military cross and the D.S.O. After the war he entered business, and became managing director of the giant British Metal corporation, Ltd. With the beginning of World War II, in Sept. 1939, he entered the ministry of supply as controller of nonferrous metals. In Oct. 1940 Winston Churchill appointed him president of the board of trade. In June 1941 he became a minister of state and a member of the war cabinet, and shortly thereafter Churchill established a precedent by sending him as British representative to the middle east, the first time in history that a full-ranking cabinet officer had been established in overseas headquarters. He was recalled in 1942 to assume the post of minister of production. To pool the production resources of the U.S. and Great Britain, he and War Production board Director Donald Nelson were named co-administrators of a combined production and resources board. In March 1945 Lyttelton accompanied a British delegation to a food parley in the U.S. He was re-elected to parliament, but the victory of the Labour party that month deprived him of his post in the cabinet.

McAfee, Mildred Helen

Miss McAfee (Mrs. Douglas Horton), (1900-), U.S. educator and naval officer, was born on May 12, 1900, in Parkville, Mo., and was graduated from Vassar in 1920. From 1923 to 1926 she taught economics and sociology at Tusculum college, Greeneville, Tenn., and in 1928 she received her master's degree at the University of Chicago. She served as dean of women at Centre college, Danville, Ky., from 1927 to 1932, and at Oberlin college from 1934 to 1936, when she was appointed president of Wellesley college. After the outbreak of World War II, she was named a member of the education advisory committee for the navy training program, working with naval personnel on plans for a women's reserve. When President Roosevelt signed the bill creating a women's naval reserve on July 30, 1942, Miss McAfee was chosen to head the WAVES (Women Appointed for Volunteer Emergency Service, the women's reserve of the navy) and she was sworn in on Aug. 3, 1942, with the rank of lieutenant commander. She subsequently rose to the rank of captain. In Aug. 1945 she married the Rev. Dr. Douglas Horton, and the following month she revealed her intention to resign as head of the WAVES in order to return to Wellesley.

Macao

See PORTUGUESE COLONIAL EMPIRE.

MacArthur, Douglas

MacArthur (1880-), U.S. army officer, was born Jan. 26, 1880, in Little Rock barracks, Ark., the son of Lt. Gen. Arthur MacArthur. Graduated from West Point in 1903, he was commissioned in the engineer corps.

During World War I he commanded the 84th infantry brigade and subsequently the 42nd (Rainbow) division, rising to the rank of brigadier general. He was appointed major general in 1925 (youngest of that rank in the U.S. army), and was advanced to full general in 1930. From 1928 to 1930 he commanded the Philippines department, and from 1930 to 1935 he was chief of staff of the U.S. army.

Gen. MacArthur became military adviser to the Philippine government in Oct. 1935, and reorganized the commonwealth's defense system. Although he retired on Dec. 31, 1937, Pres. Manuel Quezon retained him as head of all Filipino military and constabulary forces. In July 1941, MacArthur was placed in command of the combined U.S. and commonwealth forces in the Philippines. In Dec. 1941, following Japan's attack on the Philippines, he led Filipino and U.S. forces in the defense of the islands. Although heavily outnumbered in men and equipment, MacArthur slowed the Japanese advance but was forced to retire with his army into the Bataan peninsula, whose defense he had planned long in advance. He left the Philippines on Roosevelt's orders before the fall of Bataan and Corregidor and reached Australia on March 17, 1942, to assume command of the United Nations' armies in the Southwest Pacific. In the fall of 1942, MacArthur opened a campaign on New Guinea which was destined to bring that island under his control and pave the way for the successful Philippines campaign. After the conquest of Leyte in 1944 and of Luzon in 1945, he announced, on July 5, 1945, that the entire Philippines had been liberated. MacArthur, who had been made general of the army in Dec. 1944, was appointed commander of U.S. army forces in the Pacific in April 1945, and his command was extended to include Okinawa and the Ryukyus the following August.

Gen. Douglas MacArthur, aboard a flying fortress, personally directed the mass landing of Allied paratroopers behind the Japanese lines northwest of Lae Sept. 5, 1943. This surprise attack led to the capture of Lae



After Japan's surrender, Pres. Harry Truman appointed Gen. MacArthur supreme commander of Allied occupation forces for Japan. The general headed the Allied delegation that signed the Japanese surrender terms on Sept. 2, 1945. (See JAPAN.)

McCreery, Sir Richard Loudon

Sir Richard McCreery (1898—), British army officer, was born Feb. 1, 1898, and studied at Eton and the Royal Military college, Sandhurst. He joined the army in 1915 as a second lieutenant, served in France, was wounded in action and completed the war with the rank of full lieutenant. In the interval between the two world wars, he had a variety of command assignments and held the rank of colonel in 1937. He was with British forces in France during the early part of World War II and won the distinguished service order for his services in the Dunkirk campaign, June 1940. He was promoted to brigadier the following month. In Dec. 1940, he was assigned to command an armoured division.

In 1942 McCreery was appointed chief of staff to Gen. Harold Alexander, and participated in the planning of the El Alamein offensive. He was knighted and made a major general in 1943, and was later promoted to the rank of lieutenant general. In Aug. 1943, he was attached to the Allied 5th army as commander of the 10th corps and participated in the battle of Salerno and in succeeding engagements in the Italian campaign. In Nov. 1944, he was made commander of the British 8th army and held this post throughout the remainder of the war. In July 1945 the British 8th army was disbanded and Gen. McCreery was appointed commander of British occupation armies in Austria. He was transferred to command of British armies on the Rhine in March 1946

McGuigan, James Charles

Cardinal McGuigan (1894—), archbishop of Toronto, Canada, was born at Hunter river, Prince Edward Island, on Nov. 26, 1894. Ordained to the priesthood on May 26, 1918, he was named chancellor of Edmonton diocese in 1922, and vicar general of the see the following year. In 1927 he was named prothonotary apostolic and rector and president of the newly established St. Joseph's seminary. He later received a doctorate in canon law at the Catholic University of America, Washington, D.C. Consecrated archbishop of Regina on May 15, 1930, he served for four years, during which period he gained renown for his guidance in relieving distress among all classes and creeds of the population when Saskatchewan suffered one of its most severe droughts. Named archbishop of Toronto on Dec. 22, 1934, he was elevated to assistant at the pontifical throne and was awarded the title of Roman count by Pope Pius XII in 1943. He was created and proclaimed a cardinal at consistory on Feb. 18, 1946, and thus became the first native-born, English-speaking Canadian to be appointed a member of the Sacred college.

Machado y Morales, Gerardo

Machado (1871-1939), Cuban politician, was born on Sept. 29, 1871, in the province of Santa Clara, Cuba. He joined the island's separatist movement when he was a youth of 22 and was twice decorated for bravery in outbreaks that preceded the declaration of independence from Spain. After several years in private life he became inspector general of the Cuban army, and secretary of the interior in 1908. As leader of the Liberal party he was elected president in 1925 for a four-year term. By

adroit manipulation of the congress and the constitution, he first secured extension of the presidential term to six years, then effected his own re-election in 1928. Economic distress and growing unrest of the army led to his overthrow in Aug. 1933. His enemies accused him of wholesale political assassinations, and a trail of indictments followed him into exile in the United States and Europe. He was arrested in New York City at the request of the Cuban government in Nov. 1937, but the charges against him were dropped the next month. He died at Miami Beach, Fla., on March 29, 1939.

Machinery, Farm

See AGRICULTURE.

Machinery and Machine Tools

Production records set by the machine-tool industries of the United States and Great Britain during the 1937-46 decade had never been approached previously. Because of the demands of mechanized warfare, manufacture of machine tools and other production equipment in both countries was expanded tremendously. This was accomplished in a number of ways. Existing plants were enlarged, more workers were employed and trained in the necessary skills and facilities were used more hours each week. In many plants women workers performed operations formerly done only by men. More important, production of much-needed machine tools was aided in both nations by subcontracting to companies in other industries the manufacture of parts, subassemblies and even complete machines. Manufacturers of precision metal products, such as printing machinery, packaging machines, etc., who had the necessary equipment and skilled workers and whose normal products were not needed for waging war, helped multiply machine-tool production.

In normal times the machine-tool industry had been surprisingly small in both the United States and Great Britain. Prior to outbreak of World War II, the U.S. machine-tool industry was made up of about 250 companies employing about 50,000 men. Before 1939 dollar volume of shipments from plants of U.S. machine-tool builders had exceeded \$200,000,000 only once—during World War I, when total shipments for 1918 were about \$220,600,000. In the depression year of 1932 production in the United States fell off to \$22,000,000—less than any other year since 1908.

Shipments of machine tools from plants of U.S. builders during the decade 1937-46 totalled more than \$5,484,000,000, as compared with the total of \$862,000,000 for the preceding decade. These two decades (see Table I) in-

tions were included. Not included were the other metal-forming machines, such as presses, forging machines and hammers, extruding machines, brakes and shears, for which comparable totals were not available.

Production of machine tools in the United States during the decade was more than 6 times that of the preceding decade (Table I), and was more than 67% of the \$8,128,400,000 total estimated shipments for the first 46 years of the 20th century. Shipments for the 5 war years 1941-45, when U.S. production was highest, totalled \$4,179,300,000, or more than 6 times the production total of \$669,200,000 for the World War I years 1914-18. And they were almost 18 times the total of \$233,000,000 for the 5 depression years 1931-35.

By the middle of 1941 production of machine tools in the United States was more than 1,000 units for each working day. Peak total was 307,186 units shipped in 1942 (Table II). During the 3½ years from Jan. 1, 1942, to

Table II.—Number of Machine Tools Shipped in the United States

Types	Total 1942 Ship- ments	Total 1943 Ship- ments	Total 1944 Ship- ments	Jan.-June 1945 Ship- ments	Total
Boring	9,697	7,278	3,070	1,702	21,747
Broaching	1,007	802	416	246	2,471
Drilling	47,654	41,581	21,944	10,432	121,611
Gear cutting and finishing	6,435	6,186	2,683	1,179	16,483
Grinding	54,009	52,810	21,687	9,358	137,864
Lathes	88,878	80,196	43,209	21,252	233,535
Millers	47,565	30,819	10,975	5,095	94,454
Planers	981	618	344	200	2,143
Miscellaneous	50,960	45,559	31,878	15,074	143,471
Total annual shipments	307,186	265,849	136,206	64,538	773,779

Source: War Production Board and American Machinist.

June 30, 1945, U.S. machine-tool builders shipped more than 770,000 units. While large numbers of these machines were exported, machine tools in place in U.S. plants increased from slightly more than 1,000,000 in 1940 (Table III) to more than 1,711,000 units in 1945.

Table III.—Machine Tools in Place in United States Plants

Year	Total Tools In Place	Number Over 10 Years Old	Per Cent Over 10 Years Old
1930	1,127,310	554,562	49
1935	1,068,923	709,074	66
1940	1,000,112	723,947	72
1945	1,711,137	652,185	38

Note: Includes items identified as "machine tools" under the definition of "nonportable power-operated machine tools, valued at more than \$350 each, which shape metal products by progressively removing metal in the form of chips." Excludes such nontool items as shears, riveting machines, swaging machines, bending machines, forging machines and presses.

Source: American Machinist's 1945 Inventory of Metal-Working Equipment.

At its peak, the German machine-tool industry was reported to have made between 30,000 and 40,000 units annually, and Germany by the end of World War II was said to have had more than 1,000,000 machine tools to support its war machine. Some of these, of course, were stripped from plants in occupied areas. The U.S.S.R. alone was reported to have lost about 174,000 machine tools destroyed or stolen by the nazis.

Japan had about 150,000 machine tools in 1930. This was increased to about 1,000,000 units by the time World War II ended. The Japanese machine-tool industry was small, but from 1937 through 1940, the nation imported machine tools in considerable numbers from Great Britain, Germany and the United States. Japan bought about \$30,000,000 worth of power-driven metalworking machinery from the United States during 1937 and by 1939 was buying both new and used machine tools in large quantities.

According to the machinery division of the U.S. department of commerce, exports of power-driven metalworking machinery from the United States during 1938 totalled \$97,270,616, 62% more than the 1937 level. This was

Table I.—Machine-Tool Production in the United States

Year	Value	Year	Value
1927	\$87,000,000	1937	\$195,000,000
1928	128,000,000	1938	145,000,000
1929	185,000,000	1939	200,000,000
1930	96,000,000	1940	440,000,000
1931	51,000,000	1941	775,000,000
1932	22,000,000	1942	1,320,000,000
1933	25,000,000	1943	1,180,000,000
1934	50,000,000	1944	497,000,000
1935	85,000,000	1945	407,300,000
1936	133,000,000	1946 (Estimated)	325,448,000
			\$5,484,748,000

Source: National Machine Tool Builders' Association.

cluded the depression year 1932, when shipments were only \$22,000,000, and the wartime peak years of 1942 and 1943, when shipments for the first time in the history of the industry were at the rate of more than \$1,000,000,000 annually. These totals were for nonportable power-operated machine tools, valued at more than \$350 each, shaping metal products by progressively removing metal in the form of chips. Machines for drilling, turning, boring, grinding, milling, threading, broaching and similar opera-

increased to \$112,571,552 in 1939 and to \$246,516,285 in 1940. Similar data were not available for later years, but it was estimated that about 18% of the dollar value of shipments from plants of U.S. machine-tool builders during World War II went for export, chiefly to Great Britain and the U.S.S.R.

Production methods, tools and equipment employed in the metalworking industry probably were given more critical examination during the decade than at any previous time. Vast quantities of war goods had to be made in the shortest possible time; materials had to be conserved and skilled production workers were at a premium. In addition, many of the war products had to be so accurately made that better machining methods were necessary to meet the finer dimensional tolerances demanded. Attention was directed to developments that increased the metal-removing capacity of machine tools, made them easier to operate and reduced the possibility of spoilage of the workpieces because of errors in judgment on the part of the operators. Skill had to be designed into the machines, and into the jigs and fixtures used with the machines, because untrained workers from many walks of life had to be taught almost overnight to use them efficiently.

Because much time was required to design and build special, high-production machine tools for individual products, standard general-purpose machine tools were employed wherever possible in armament plants. This gave the machine-tool industry an opportunity to make these machines in large quantities, with consequent reductions in time required per machine. In many instances general-purpose machine tools were adapted to mass production operations by equipping them with suitable auxiliary work locating and clamping devices arranged for automatic-cycle operation. In other cases, the design and construction of special machines were justified, by the increased production they made possible, or because they were needed to ensure manufacture of precision parts within tolerances almost impossible to achieve by other methods. Many such examples were to be found in the aircraft engine industry and in plants making ultra-precise navigation instruments.

Perhaps the high point in special machines developed during World War II for mass production of needed parts was the construction of several similar automatic transfer machines for milling, drilling, countersinking, reaming and tapping aluminum cylinder heads for radial aircraft engines. One of these machines replaced 40 general-purpose machine tools. It was made in two sections. The first had 16 stations where 25 separate operations were performed with 64 tools; the second had 53 stations where 46 operations were performed with 70 tools. A completed cylinder head was delivered every two minutes. Electric lights at a control desk indicated completion of each individual operation performed by the machine, or informed the operator when something was out of order at any station. After World War II, a similar transfer-type machine was built to machine refrigerator-compressor bodies at the rate of 188 per hr. Two workpieces on each fixture were moved successively to 24 stations so that 31 different operations could be performed. A total of 152 cutting tools was used.

Broaching, as a metal-removing operation, found increasing application throughout the metalworking industry during 1937-46. Some of the broaching machines were of huge size, particularly those constructed just prior to World War II for surface-broaching cylinder blocks for automobile engines and for spline-broaching gears. An important

development was the internal broaching of a rough-cast cored hole, without the broach following the out-of-line conditions of the hole. Another was the introduction of circular broaching, by means of which circular key slots and similar surfaces could be cut in a single pass of the tool.

One of the difficult, time-consuming operations in gun manufacture had been cutting of rifling grooves. Considerable attention was given this operation during World War II, with notable success in reducing the time required and in increasing the accuracy with which the grooves could be cut. Prior to about 1941, rifle and gun barrels were rifled with hook tools, one groove being cut at a time in a series of multiple passes. Analysis showed that pull broaches could be used to cut all of the grooves at one time in rifle and gun barrels in the calibre 0.30-37-mm. size range. The process was much the same as that used for cutting internal splines. For the calibre 0.30-0.550 gun barrels, an automatic multiple-station machine was developed to use a set of 5 broaches. Barrels were chucked in a horizontal drum, which was indexed automatically from the loading position successively to each of five broaching positions. Burrs at the edges of the rifling lands were removed by having the last three or four teeth of the final broach scrape the lands or bore of the barrel. Handling of the five broaches was automatic; the operator had only to place and remove the barrels from the indexing drum.

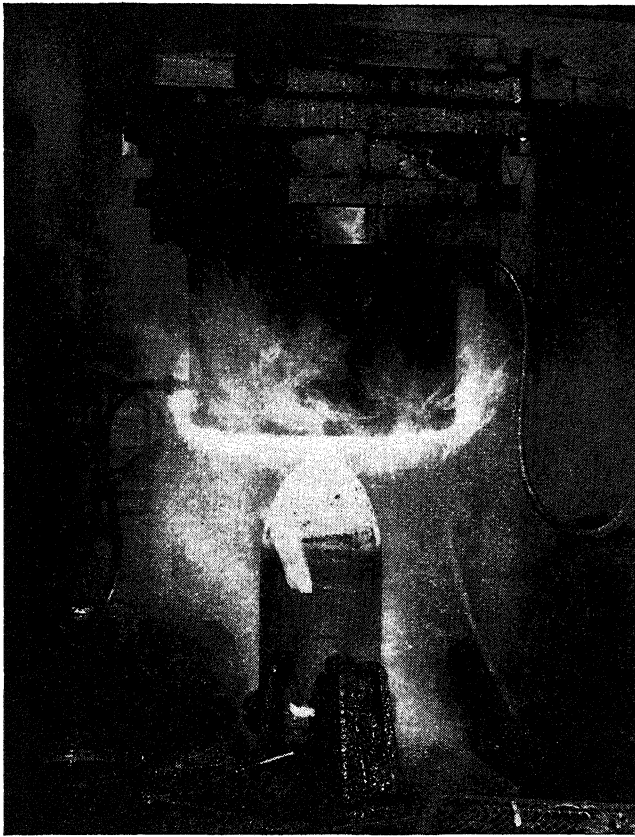
For the 20-mm. cannon barrel, 1 company developed a horizontal hydraulic-broaching machine with which a set of 4 solid helical broaches was used to complete the rifling at an average rate of about 10 min. per barrel. Another company developed an 8-station indexing machine with which 37-mm. antitank gun barrels were rifled complete with 7 broaches at the rate of 1 every 3 min.

Guns of larger calibre, ranging from 37-mm. to 6 in., usually were rifled by push broaching, using flat disks that were pushed through the gun bore successively on horizontal machines. Sometimes 30 or more such disks were used to complete the grooves in the bore of each gun. But all grooves were cut simultaneously, and the time saved was appreciable as compared with the older method requiring 30 or more passes in each groove with a hook tool.

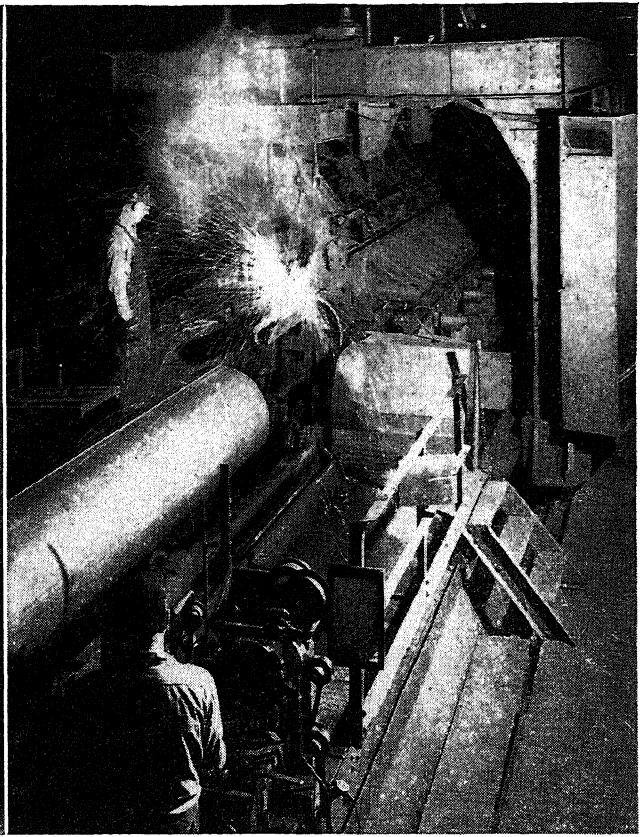
Broaching also found other applications in the manufacture of rifle and gun parts. Such parts as triggers, trigger guards, sight bases, etc., were surface-broached economically. Formerly these parts required expensive operations involving a number of setups on milling and profiling machines.

An outstanding application of surface broaching during World War II was in the machining of spindle blades for several sizes of marine turbines. In one plant 66 different blades were required for the 3 sizes of turbines manufactured. These blades were made from specially heat-treated, corrosion-resistant stainless-steel bars having a hardness of about 200-240 Brinell. Formerly the blades were made in a series of form-milling operations; by using surface broaching, expenditure for costly milling fixtures was reduced materially, and time required to machine a set of blades was slashed. A special rotary-broaching machine finished the dovetail slots in each blade to ensure a tight fit on the turbine spindle.

Throughout the 1937-46 decade, machine-tool designers and production engineers paid increasing attention to the problem of producing smooth machined surfaces of high accuracy. Several methods for measuring and evaluating the quality of machined surfaces were developed, as were a number of novel methods for producing those finishes on



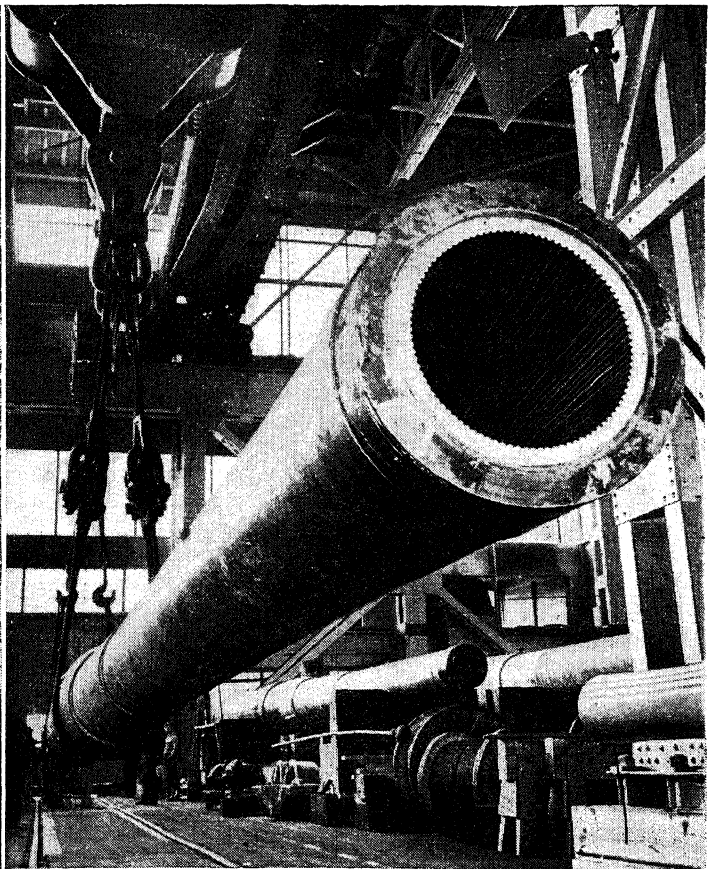
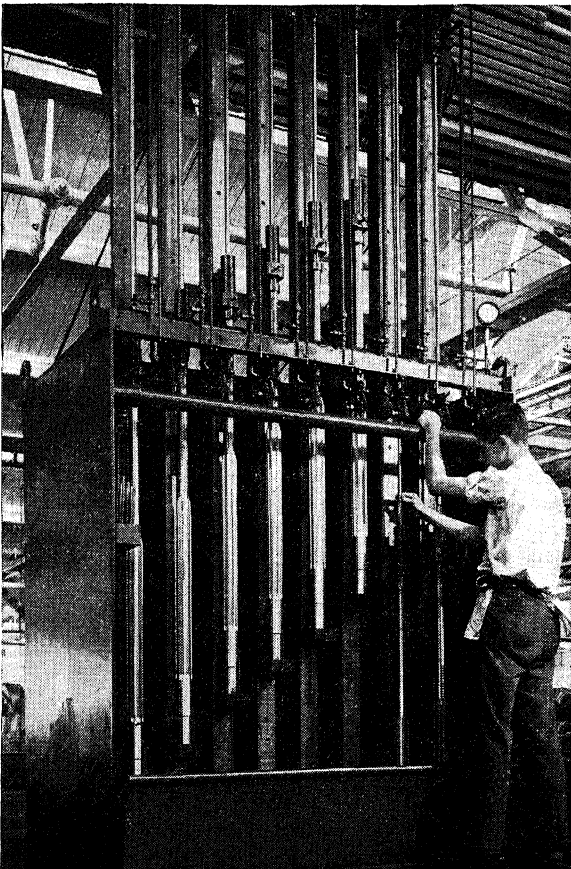
Above: Mechanical press shaping the nose of a 500-lb. bomb at an ordnance plant in Milwaukee, Wis., during 1941



Above: Welding operations on a length of pipe for an oil pipe line

Below: Eight-spindle vertical reamer used in the production of 20-mm. machine guns during World War II by the Pontiac Motor Co., at Pontiac, Mich.

Below: Manoeuvring a giant 16-inch gun into place for finishing treatment of the outer surface of its muzzle, at the Washington, D.C., navy yard in 1944



a variety of parts. Outstanding was the development and adoption of the crusher method of dressing abrasive wheels for thread and form grinders. Several manufacturers of grinding machines developed units incorporating this method of wheel dressing, including the maker of a new centreless thread grinder. This machine used a grinding wheel carrying multiple thread profiles formed by a cylindrical crusher roll with grooves in its periphery. The crusher was made of hardened steel and was rolled against the periphery of the grinding wheel with sufficient force to break down the bond of the abrasive, leaving the desired profile on the peripheral surface of the wheel. This machine ground accurate, smooth threads in hardened steel, set screw blanks in a single operation. Workpieces were fed between the grinding wheel and the regulating wheel one after another, as in a conventional cylindrical centreless grinder. Feed could be by hand or by means of an automatic loader.

The crusher method of dressing grinding wheels found an increasing field of application in the form of the grinding of longitudinal surfaces with a surface grinder. During 1945 one manufacturer announced development of an electrically powered crush-dressing device suitable for application to new or old machines. These power-dressing devices had several advantages over manual crush dressing, including reduction of wheel-dressing time by as much as 50% and increased life of the crusher roll resulting from the uniformity of crushing and smoothness of infeed. More parts were claimed per dressing because the wheel was always formed under identical conditions of infeed and pressure.

The decade also witnessed development of a process for producing an extremely fine finish on flat, internal, external, round, concave, convex and other surfaces. Known as the "superfinishing" process, it achieved its results by a combination of short motions, light abrasive pressures, slow abrasive cutting speeds, hard abrasive stones and a lubricant of carefully selected viscosity. At first glance, this process appeared to differ in no material detail from honing, similar stones—generally under spring pressure—being used. There were, however, several characteristic differences. The abrasive stones were applied against the work with extremely light pressures and moved in several different directions, only one of which was in the direction of marks produced by the cutting tools with which the preceding operation was performed.

The honing process, too, was improved to the point where stock removal could be controlled by selection of proper abrasive stones and operation conditions. In 1946 honing could be used to remove 25–30 times as much metal as ever before was practical with this process. In the manufacture of a steel cylinder barrel for an aircraft engine, 0.044 in. of stock was removed from the bore in 3.75 min. of processing time, using 3 honing operations. No grinding operation was necessary before honing.

A particularly interesting development in the surface-finishing field during the decade was that of an external horizontal hydraulic-honing machine having capacity for bars up to 5 in. diameter and up to 30 ft. long. In this machine, the work rotated and reciprocated through the hone head, mounted in a fixed position near the centre of the long main bed. Rotation of the work could be stopped while reciprocation was continued, in order to obtain "straight-line" honing, should this be desired.

A number of important developments took place in the gear-cutting and finishing field. Among these were the de-

sign and manufacture of a number of machines for finishing gear teeth by the "shaving" process, in which the cut gear was meshed with a serrated cutter and rotated for a predetermined length of time. The serrations in the teeth of the cutter removed thin shavings from the teeth of the gear, bringing them to correct size and shape. Another important development, particularly applicable in mass-production industries, was the announcement early in 1945 of a new method for rough and semifinish cutting the teeth in spur and helical gears up to 4 in. in diameter and 2 in. in face width. This vertical machine operated on the gear-shaper principle but employed an enveloping cutter head in which individual blades simultaneously cut each tooth of the gear. After each stroke of the cutter, an internal cone was adjusted automatically to move the blades inward a predetermined distance for the next cut. Such machines were used in conjunction with high-production gear-shaving machines.

The war years saw a tremendous increase in the use of cutting tools made with cemented carbide cutting tips. As a result, metal-removal rates for many turning, boring, drilling, reaming and milling operations were raised to new high levels. Carbide-tipped milling cutters having negative rake and helix angles made it possible to cut tough alloy steels at surface speeds of 400–600 ft. per minute, while mill steels were milled at up to 900 ft. per minute. With these speeds, feed rates of up to 60 in. per minute could be employed. Spectacular results were obtained when properly designed carbide-tipped milling cutters were used for cutting aluminum alloys in special aircraft wing spar millers. Here, cutting speeds of 10,000–20,000 ft. per minute, and feeds of up to 240 in. per minute were found satisfactory. Several years of milling cutter study along these lines resulted in the design of highly efficient tools suitable for the new high-power milling machines, as well as for use at lower speed and feed rates on older machines.

Spectacular results obtainable when milling with negative rake cutters led one ball-bearing manufacturer to experiment with the use of negative cutting rake angles on carbide-tipped single-point turning and boring tools. Surface speeds as high as 1,200 ft. per minute were tried, but 800 ft. per minute gave the best results when turning high-carbon, high-chrome alloy steel forgings. For boring, 615 ft. per minute was selected as the best cutting speed. Best feed was 0.015 in. per revolution. Rigid tool setup was essential. This application was unusual because of the very high speeds involved. But just as important were the higher-than-usual cutting speeds obtained throughout World War II when using carbide-tipped turning and boring tools for such varied operations as machining shell forgings, armour-plate castings for tanks and other armoured vehicles, gun tube forgings and castings and the many other steel parts on the army and navy ordnance procurement lists.

Drilling of holes with lengths many times their diameters had always been a difficult problem, particularly where high accuracies were necessary, as in drilling rifle and gun tubes. Drills had to be designed to permit delivery of a coolant or cutting fluid to the cutting edges, both to lubricate the drill point and to wash the chips back through the drilled hole as cutting progressed. With steel cutting edges, these drills usually had to be changed frequently since any dulling of the edges would cause the drill to "lead off" and produce an inaccurate hole. Gun drills with carbide tips and carbide wear plates, another wartime development of considerable importance, gave exceptionally high production rates because of fast per-

missible speeds and long life between regrinds. Standard drills as small as 0.293 and 0.300 in. in diameter were used for drilling rifle barrels and other ordnance parts made from steel up to 380 Brinell hardness and were run as long as 20 hr. between grinds. Compared with high-speed steel drills, feeds in some cases were doubled.

For many years the cemented carbides were used almost entirely for tipping cutting tools and for wire-drawing dies. Many other important applications were made. During World War II, shell-nosing dies and draw dies for brass and steel cartridge cases were made with carbide inserts. The high wear resistance and nongalling properties of the carbides gave such dies longer life and also helped conserve hard-to-obtain tungsten tool steels. Grinder work-rests, gauge elements, sleeve bearings for high-speed machine spindles, boring bars, knurling rolls and clamping device facings were among the other important uses for which these materials were found efficient. Young's modulus of elasticity for the cemented carbides was 2.4-3 times that of steel; so small-diameter carbide boring bars were stiffer than steel bars and they were used for precision boring holes without taper to greater depths than was possible previously. During World War II, approximately 12,000,000 heavy-gauge oil cans were seamed with a carbide roll. Steel rolls for the same operation were worn out after seaming 100,000 cans. There were several applications of carbide sleeve bearings on grinder spindles in which wear was not measurable after more than a year of use at high speeds. Ball bearings formerly used on the same spindles wore out in a week or two at the best.

Use of cemented carbides in punch press dies for piercing, blanking and forming operations were considered impractical until production requirements for war goods led to further trials. Not all applications in this field were successful, but others showed increases in die life of 10-100 times that of steel punches and dies. During World War II a company made radio-tube base parts from 0.0095-in.-thick stainless steel sheet having a hardness of 87 Rockwell B. Punching, drawing and trimming dies made of conventional steels needed redressing after every 50,000-60,000 parts. With cemented carbide inserts, a set of dies blanked, drew and trimmed more than 8,000,000 of these bases without stopping to rework the tools. Another company making radio tubes found use of cemented carbide die inserts so economical that by 1946 from 50% to 75% of the dies constructed included carbide parts. Most of them were used for work on 0.005-in. thick stock. In some cases these dies produced up to 18,000,000 tube parts between die sharpenings, where runs up to 100,000 parts were unusual with steel dies. Carbide inserts in dies for punching laminations from silicon steel sheets also gave outstanding service results.

Because of the tremendously increased activity in the aircraft industry during the 1937-46 decade, special attention was paid to press-forming operations on sheet-metal parts, particularly sheet aluminum and magnesium alloys. Tool engineers in this industry were called on to develop and make tools for forming, trimming and perforating sheet steel, aluminum and magnesium parts without taking the months of time that would have been needed for making steel tools of conventional design. They turned to the so-called quick and dirty methods of tool design—methods that were adaptable to the rapidly changing demands of designers of new warplanes. They employed plastics and low-melting-point metal alloys that could be cast to shape quickly, eliminating tedious toolmaking hours needed for steel or iron tools. Also they developed new, and improved old, sheet-forming methods that saved thousands of hours.

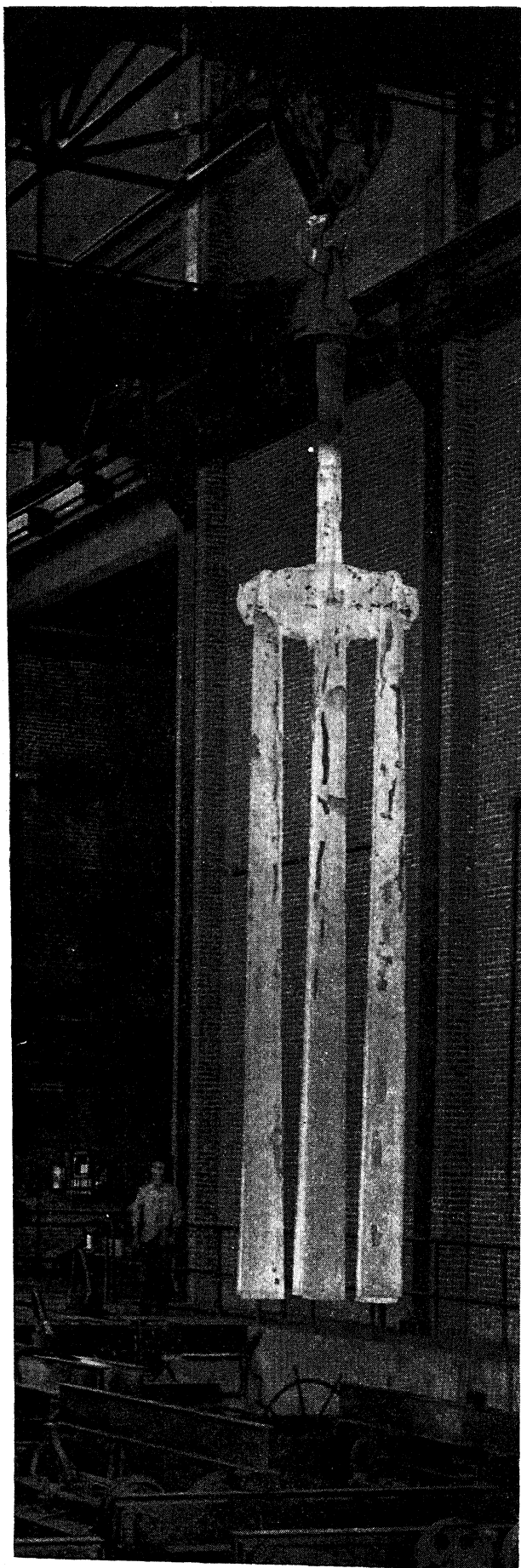
The rope drop hammer was revived as a sheet-forming machine, and it was supplemented by a more efficient air-operated counterpart. These units, when properly tooled, made many of the double-curvature sheet parts needed for completely streamlined aeroplanes. Lead, zinc and other soft-metal alloys were used to make forming tools for these hammers. The drop-hammer method differed from other sheet-forming processes in two ways. It was a free-fall operation and the operator could control its action as much as when a hand hammer was used. The second difference lay in the fact that this process had an upsetting or shrinking effect, rather than a drawing or stretching effect on the sheet being formed. The process was flexible and adaptable to forming a wide range of shapes.

Because the drop-hammer method did not have sufficient precision for some of the parts required, and because it was relatively slow as compared with press-forming operations, aircraft tool engineers continued studies of press-forming methods. Out of these studies came a number of novel tooling developments, chief among which probably was the Guerin process, in which sheet parts were formed between a heavy rubber pad and shaped die blocks made of metal, wood or plastic. The rubber pad was fixed in a container attached to the moving platen of the press and was forced to flow around the shaped die blocks as the pad was brought down against a pressure pad on the bottom platen. Full pressure applied by the press ram thus was exerted evenly in all directions on the exposed surfaces of the die blocks. Blanking, forming and punching operations could be performed on thin sheet parts placed on the die blocks.

Large-platen hydraulic presses having capacities up to about 5,000 tons were installed during World War II in aircraft plants for forming sheet parts by the Guerin process. Many of these presses were equipped with loading tables to shuttle the tools and material to and from the pressing block and so increase the efficiency and quantity of production possible from a single press. In these instances, a group of workers placed forming blocks and metal sheets on the loading tables outside the press, while pressure was being applied to a table load between the press platens.

An alloy of zinc with aluminum, copper and magnesium (Kirkosite) found wide use in the aircraft industry as a tool material. It was relatively inexpensive, easy to work with and could be reused to make other tools when the first tool had served its purpose. At first it was used principally to replace the zinc dies used for drop-hammer forming operations. Later it found wide use in making forming, blanking and piercing dies for press operations in which rubber pads were employed and in the construction of mating dies for more conventional punch-press operations. Actual over-all time for producing a cast die of this material often was as low as eight hours, compared with three or four days for tool steel dies. Rubber pads frequently were used with these dies as "strippers" to force the workpieces off the punches on the return stroke of the ram. Sometimes these pads were applied on both the punch and the die.

Plastic and semiplastic materials, such as the laminated plastics and pressed woods (Masonite), were widely accepted for making, forming and bending dies in the aircraft industry. They required less time to make, cost less and frequently had a longer useful life than actually required. Few such dies were required to make more than 5,000 parts before the part became obsolete because of design changes.



Many mating dies made of these materials formed intricate shapes from aluminum or magnesium alloy sheet stock to as close limits as would have been possible with more conventional metal dies. Tough, elastic thermoplastic materials also found use for making cast drop-hammer forming punches in the aircraft industry. Often these plastic punches were formed by pouring the melted material into the mating metal hammer die.

The plastic materials used were reclaimable without sacrifice of physical properties.

A number of aircraft plants made drill jigs and other tools, including forming dies that stood up under 8,000 lb. per square inch pressure in hydraulic press operations, from castable plastic materials. Among these materials were a phenolacetone thermoplastic and an acid-setting phenolformaldehyde thermosetting composition made up of 25%–30% ground walnut shell flour, used as a filler, with resin and an acid catalyst or accelerator. Other fillers used included wood flour and scrap plastic. The jigs were fabricated by securing the drill bushings to a master part, placing the part in a form and pouring the melted plastic material around it.

Like the rope drop hammer, the stretch-forming press was revived by aircraft production engineers for use throughout World War II. It consisted of a vertically movable platen on which a suitable form block was attached. The metal sheet was clamped over the top of the form between jaws fixed to the base of the machine. Upward movement of the platen forced the sheet to assume the contour of the form block. By using electric or hydraulic controls, the operator increased or retarded the rate of vertical travel of either end of the platen. This "rocking" of the form block distributed tension developed in the sheet as it was stretched, and aided in developing the desired form without wrinkles.

One of the machines developed during the war was fully hydraulic and had three rams supporting the platen. It was of 150-ton capacity, and the 84-in. long jaws could be positioned 28–150 in. apart. Another stretch press, announced in 1942, applied load to the sheet with 2 trunnion-mounted, 60-ton-capacity hydraulic cylinders. While the tool platen was mounted on three rams to permit positioning the tool block most advantageously, the block was not moved during the forming operation. Instead, the tension jaws acted in a constant, predetermined direction to maintain the best angle of pull over the edge of the block. Sheet breakage was reduced materially. With this unit, a sheet 267 in. long, 48 in. wide and 0.081 in. thick could be stretched into a continuous double curvature in less than 2 min. after the sheet had been inserted in the jaws and placed over the form block.

Form blocks for stretch presses during World War II were made of wood, cast iron, pressed wood (Masonite), soft metal alloys (Kirkite) or one of the cloth-base phenolic-resin-bonded materials. Concrete and cast plastics also were used satisfactorily. Wood blocks served well when production requirements were low. Other materials were necessary when quantities to be stretch-formed were 1,000 or more. (See also AUTOMOBILE INDUSTRY.)

Tubes of U.S. anti-aircraft guns, cast in one piece by a revolutionary method developed by the army ordnance department. Molten or liquid metal was poured into a chill mould and rotated at a high speed so that centrifugal force caused the metal to take the shape of the mould before it solidified, leaving a hollow in the centre. The casting was removed from the chill mould as soon as it was solid and rigid enough to keep its shape during handling. After cooling, it was heat treated to get the desired crystalline structure of the metal and then machine finished and further heat treated.

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Great Britain.—The machine-tool industry in Germany and the United States was self contained. The industry in Great Britain was smaller, and there were many gaps which compelled the importation of special types of tools. Nonetheless, there were more than 10,000 different types or sizes of standard machine tools made in Great Britain while thousands of special tools were designed during the decade to perform specific operations with maximum efficiency. The British government was aware of the importance of this key industry and had set up a committee to report upon the measures that would be necessary to ensure an adequate supply of machine tools to meet the national requirements in the event of emergency. When the intentions of Germany could no longer be in doubt and firms in Great Britain had reluctantly accepted exploratory orders for munitions, and when it became, in consequence of the threat of war, necessary to develop the aircraft industry, machine-tool makers were called upon for the tools required.

At the beginning of 1937 the output of the machine-tool industry was at the rate of £8,250,000 per annum. At the outbreak of World War II in 1939 it had increased to £16,000,000 per annum. With the formation of the ministry of supply in June 1939, a machine-tool adviser was appointed in that ministry. In the legislation which was made necessary by the imminence of war, the Control of Machine Tools Order No. 1, 1939, had a prominent place. It gave to the minister of supply the widest powers concerning the production, distribution and use of machine tools so that the necessary priorities both in the manufacture and use of machine tools could be assured. At the outbreak of World War II the control of machine tools was set up within the ministry of supply. It continued until 1946 when an advisory council was appointed by the ministry to provide a means of regular consultation between the government and the machine-tool industry on matters concerned with the maintenance of an adequate and healthy British machine-tool industry in the interests of national defense and industrial efficiency. The importance of this key industry, so amply demonstrated during 1939-45, was not to be forgotten.

It was the duty of the machine-tool control to take such

steps as were necessary and practicable to ensure that only essential orders were placed. Licensing and examination of the utilization of machine tools were introduced for this purpose. Examination was directed both to plants already installed and to the use intended to be made of plants covered by prospective orders. As a result, manufacturing programs of contractors were simplified; production departments were able to weed out inefficient contractors; equipment was realigned between contractors with advantage to production. Thus great savings became possible in machines and labour employed, resulting in much greater production efficiency. Only scientific planning could bring about this result.

To assist the control in its work, an Emergency Machine Tool Armament corps (E.M.T.A.C.) was set up in Sept. 1941. It consisted of expert demonstrators and operators in different classes of machines who were recruited from the machine-tool trade and made available to all war contractors for the purpose of training labour and starting up new machines. The allocation section of the control was the department for arranging the fulfilment of priority requirements. In this function of its work the control was responsible to the main government priority committee until June 1942, when the ministry of production was set up, whereupon the machine-tool control became responsible on allocation questions to the minister of production. It is interesting to note that there was hardly any occasion when the control had to refer to higher authority on allocation problems, and this absence of disputes was a tribute to the co-operation achieved by the members of the supply departments who formed an inter-service machine-tool committee to advise the control on these matters.

The comparative smallness of the industry at the outbreak of World War II made a thorough control of machine tools essential to assure a rapid expansion of production and their provision for all manufacturing processes. The output of the British machine-tool industry, which had fallen as low as £6,500,000 in 1935, rose to a peak of £43,750,000 in 1942. At the same time, the production by the trade of cutting and engineers' small tools accounted for a similar increase in volume of output. Invaluable help came from the U.S. machine-tool industry. Importation of U.S. machine tools and cutting tools averaged about £22,500,000 a year during World War II. The peak was reached in 1943, with imports of £31,250,000. A machine-tool department with the British purchasing commission had been set up in Washington. Its task of procurement was greatly helped by the U.S. authorities' understanding of the importance of machine-tool and machinery supplies to Great Britain for the prosecution of World War II.

Other plants and machinery also came under control at the outbreak of war. The production of types essential to the manufacture of war supplies had been taken in hand after Adolf Hitler's attacks on Czechoslovakia and became the care of the ministry of supply on its formation in June 1939. Control was exercised to make the best use of existing resources and of labour. Control of other plant and machinery was vested in the board of trade. Reversing its usual role of fostering production in the interests of trade, it was concerned with preventing production not essential to the prosecution of the war. Indeed, the extent of World War II in which the British forces played their part everywhere, made an unprecedented call on Great Britain's manpower. Controls accordingly were designed not only to ensure production of those things that

Table IV.—Machine-Tool Production In Great Britain

Year	Value
1924	£ 3,507,000
1930	4,876,000
1934	4,637,000
1935	6,531,000
1936	9,347,000
1937	8,452,000
1938	13,300,000
1939	19,050,000
1940	29,200,000
1941	30,450,000
1942	43,750,000
1943	31,308,000
1944	25,764,000
1945	20,796,000
*1946	23,640,000

*Based on monthly average for seven months.
Source: British Ministry of Supply.

were needed but also to forbid production of nonessentials and to save manpower and womanpower wherever the provision of the right equipment could bring about this result. It is worth recording that, in the machine and tool industries themselves, out of a total maximum labour force of about 120,000 more than 25% were women. Before the outbreak of war, practically no women had been employed in these industries.

In 1945 and 1946 wartime controls were largely removed to allow initiative and freedom of choice to play their proper part in industrial affairs. While they existed, they taught the industry a useful lesson of co-operation in which selfish aims were subordinated to the general good. Such co-operation procured results far greater than would have been possible had individual interests constituted the beginning and end of endeavour. (P. H. M.)

McIntyre, Marvin Hunter

McIntyre (1878-1943), U.S. newspaperman and presidential secretary, was born Nov. 27, 1878, in La Grange, Ky. He started newspaper work at the turn of the century and later became editor of the *Washington Times*. In 1917, he entered the navy department as public relations officer and made the acquaintance of Franklin Delano Roosevelt, then assistant secretary of the navy. In 1932 McIntyre helped handle publicity for Roosevelt's presidential campaign. After the election McIntyre was given the post of assistant secretary and in 1937, after the death of Louis Henry Howe, he was made secretary, a post he held until his death, Dec. 13, 1943, in Washington, D.C.

Mackenzie King, William Lyon

See KING, WILLIAM LYON MACKENZIE.

McNair, Lesley James

McNair (1883-1944), U.S. army officer, was born May 25, 1883, in Verndale, Minn., and graduated from the U.S. Military academy in 1904. He served with the Funston expedition to Veracruz, Mexico, 1914, and the Pershing expedition to Mexico, 1916. During World War I he saw duty with the 1st U.S. division in France, was attached to general headquarters of the A.E.F. and was awarded the distinguished service medal. Before U.S. entry into World War II, he was assigned to duty at the Army War college in Washington, D.C. After reorganization of the war department general staff in 1942, McNair became commanding general of the army ground forces. He saw active duty in the North African campaign, and while at a forward observation post in northern Tunisia was wounded by shell fragments and returned to the U.S. for treatment. He resumed command of the ground forces on May 26, 1943, but subsequently left this post for what the war department termed an "important overseas assignment." On July 25, 1944, Gen. McNair was killed at a front line post near St. Lô, Normandy, when bombs dropped by U.S. planes fell short of their targets and hit U.S. lines by error.

McNarney, Joseph Taggart

McNarney (1893-), U.S. army officer, was born Aug. 28, 1893, in Emporium, Pa. He was graduated from the U.S. Military academy, West Point, N.Y., in 1915, and served with the U.S. air forces in France in 1917-18. In 1926 he was graduated from the Command and General Staff school at Fort Leavenworth, and in 1930 was graduated from the Army War college, Washington, D.C.,

where he then served as instructor from Aug. 1933 to March 1935. In March 1939 he joined the war plans division of the war department general staff. McNarney was made a member of the Joint Defense board for Canada and the United States in Aug. 1940, and served with the special observers group in London from May to Dec. 1941. He was a member of the Roberts commission that investigated the Pearl Harbor attack (Dec. 1941-Jan. 1942), and in March 1942 he was appointed deputy chief of staff, the youngest officer ever to hold that position. In May of the same year he was made a lieutenant general. In Oct. 1944 McNarney left his desk job to become deputy supreme Allied commander in the Mediterranean, and in 1945 he was promoted to the temporary rank of full general. When Gen. Dwight Eisenhower was elevated to the post of chief of staff in Nov. 1945, McNarney succeeded him as commander of U.S. forces in Europe and concurrently as commander of German occupation forces and U.S. representative on the control council.

McNary, Charles Linza

McNary (1874-1944), U.S. politician, was born June 12, 1874, near Salem, Ore. He studied law at Stanford university and was dean of Willamette College of Law, Salem, Ore., 1908-13. In 1913 he was elected to the Oregon supreme court, and in 1916 he became chairman of the Republican committee for the state. The next year he was appointed to fill out an unexpired term in the U.S. senate, was elected to that office in 1918 and served there until his death. During his early career in the senate, McNary was a fighting liberal and an advocate of farm relief. He was co-author of the series of McNary-Haugen farm relief bills, several of which were passed by both houses of congress, but were vetoed by Pres. Calvin Coolidge. He became minority leader of the senate in 1933, and voted for many New Deal measures in the early days of the Roosevelt administration. However, he led the fight that defeated the supreme court reorganization measure, and in the 1940 presidential election he was selected as Wendell Willkie's running mate. Senator McNary died in Fort Lauderdale, Fla., Feb. 25, 1944.

McNaughton, Andrew George Latta

McNaughton (1887-), Canadian army officer and scientist, was born at Moosomin, Sask., Feb. 25, 1887. He was educated at McGill university and served in World War I, being wounded twice and mentioned in dispatches three times. In May 1919 McNaughton was appointed member of the committee for the reorganization of the military forces of Canada. He was named deputy chief of the Canadian general staff in 1922 and was promoted to the office of chief of general staff in 1929. As president of the Canadian national research council from 1935 until 1939, McNaughton directed research in electrical and aeronautical investigations, and was joint inventor with W. A. Steel of the cathode-ray direction finder. In Oct. 1939 he was appointed commander of the Canadian active service forces and was responsible for the intensive training and scientific arming of the Canadian forces both at home and abroad, including the Canadian troops which took part in the Allied raid at Dieppe on Aug. 19, 1942. Because of ill-health Gen. McNaughton resigned the command of the Canadian active service forces and announced his retirement in Dec. 1943.

In Nov. 1944 Gen. McNaughton returned to public service as minister of national defense, succeeding Col. James L. Ralston. Failing in two attempts to secure a seat in the house of commons, as representative of an

Ontario constituency in Feb. 1945 and as representative from Saskatchewan in June, he resigned from the ministry in August and was appointed chairman of the U.S.-Canadian permanent joint defense board. In April 1946 he was named Canadian representative on the United Nations atomic energy commission.

McNutt, Paul Vories

McNutt (1891-), U.S. politician and government official, was born July 19, 1891, in Franklin, Ind. Educated at Indiana university, Bloomington, Ind. (A.B., 1913), and at Harvard university, Cambridge, Mass. (LL.B., 1916), he served on the faculty of the Indiana university law school from 1917 to 1925, and was dean of the law school from 1925 to 1933. In 1933 he resigned to become governor of Indiana. He was U.S. high commissioner to the Philippines from 1937 to 1939, when he was appointed first administrator of the Federal Security administration. In April 1942 President Roosevelt named McNutt head of the War Manpower commission, and in December of that year vested him with full authority to hire and distribute workers for civilian war industries and with full control of the Selective Service system; in Dec. 1943 a new draft bill was enacted which deprived McNutt of his power over Selective Service. Appointed by Pres. Truman high commissioner to the Philippines on Sept. 6, 1945, McNutt became U.S. ambassador after the commonwealth was declared a republic on July 4, 1946.

Madagascar

See FRENCH COLONIAL EMPIRE.

Madeira

See PORTUGUESE COLONIAL EMPIRE.

Madras

Capital of Madras presidency, the chief seaport on the eastern coast of India and third city of India, Madras is situated in 13° 4' N. and 80° 17' E. In 1941, the city had a population of 777,481. Municipal progress was greatly interrupted by World War II, and, because of threats of Japanese bombing attacks, a large proportion of the population temporarily left the city to go inland. The length of metalled roads was extended from 358 mi. in 1936 to 372 mi. in 1944, and the main streets were lighted with electricity. In 1942 a serious attempt was made to eradicate the slums; two areas of 492 ac. were acquired by the municipality to be used as housing estates. Education was nominally compulsory, but there were practical difficulties in enforcing the law, especially as regards girls. In the period, the number of children attending the public elementary schools increased from 27,282 to 37,613. Madras university had 37 affiliated colleges with 12,000 students. In 1944-45 the birth rate was 31.45 and the death rate 35.72 per 1,000. Infant mortality was 273.77 per 1,000 registered births. (H. G. RN.)

Madrid

The capital of Spain and of the province of Madrid, on the left bank of the river Manzanares, had a population in 1940 of 1,088,647. In Jan. 1937, when the British embassy moved to Valencia—the republican capital during that year—Madrid had been under siege by General Francisco Franco for two months. Attempts made to cut the Madrid-Valencia road and then to attack the city from the northeast both failed. Though continually bombed and all but starving, the capital held out, with magnificent morale, till Catalonia had fallen and the whole of the

nationalist strength, reinforced by help from Germany and Italy, could concentrate upon it. On Feb. 12, 1939, Dr. Juan Negrín's cabinet returned to Madrid, re-established as the republican capital. On March 5 this was superseded by a "National Council of Defense" which quickly negotiated a surrender.

Entering Madrid, where hundreds were dying daily of starvation, on March 28, the nationalists quickly relieved the immediate suffering, set about rebuilding and published ambitious plans for the capital's enlargement and amelioration. Soon after the victory parade (May 19, 1939), General Franco's ministries arrived from Burgos; schools and colleges re-opened and Madrid's appearance re-approached the normal. Much bomb damage, however, still remained: in particular, the grandiose university city, which had borne the brunt of the attack, was for two years a total ruin, and was not fully restored until 1945.

During the hardest of the years following the civil war, Madrid, with its large population, suffered terribly. By Nov. 1940 its bread ration was from three to six ounces (varying with the individual's income) and in the following spring this ration was halved. Other foods also being scarce, the black market flourished, as also did street-begging, epidemics (notably typhus in 1941) and tuberculosis. From the end of 1942 the food situation improved, though inordinately high prices still ruled.

As the capital of Spain, Madrid reflected many of the vicissitudes of the country's life during World War II. Diplomatic battles were fought in the embassies; street demonstrations marked Spain's ill-judged annexation of Tangier (1940); contingents of the Blue division paraded before leaving for Russia (1941-44). German penetration, at its height during 1940-42, gradually diminished after the North African landings, and, on the defeat of the axis powers, the Germans still in Madrid were slowly dispatched, after much pressure by the United Nations, to their own country.

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Magazines and Periodicals

See ADVERTISING; NEWSPAPERS AND MAGAZINES.

Maglione, Luigi

Cardinal Maglione (1877-1944) was born March 2, 1877, at Casoria near Naples. Ordained priest in 1901, he entered the papal diplomatic service and was sent to Switzerland in 1918 as special representative of Pope Benedict XV. Through his efforts a nunciature was established at Berne and he became the first nuncio there. He was consecrated titular bishop of Caesarea of Palestine Sept. 26, 1920. In 1926 he was transferred from Switzerland to Paris as apostolic nuncio to France. He was created a cardinal on Dec. 16, 1935, and the following year was recalled to Rome to serve on several congregations of the Curia. Pope Pius XII named Cardinal Maglione papal secretary of state on March 11, 1939, a post Pius himself had held before his elevation to the papacy. Some authorities interpreted the appointment as a papal gesture of amity for the democratic governments, although the new secretary gave little indication of his political leanings during the troubled years of World War II. He died at his home in Casoria, Aug. 22, 1944.

70 Magnesium

The history of the magnesium industry during World War II was a good example of what could be accomplished under the pressures of necessity. In only a few short years, magnesium was raised from the rank of a minor metal to that of a major one, and it remained to be seen at the end of the decade 1937-46 whether sufficient demand could be created for peacetime uses to enable it to retain its major ranking. Exact data were lacking on magnesium production in many countries, but estimates are presented in Table I.

Table I.—World Production of Magnesium

	(Short tons)									
	1937	1938	1939	1940	1941	1942	1943	1944	1945	
Australia	—	—	—	—	220	470	880	990	?	
Canada	—	—	—	—	5	405	3,577	5,290	3,726	
France	1,650	2,000	2,750	2,824	2,103	1,468	1,919	928	?	
Germany	13,300	15,500	18,200	22,200	27,500	38,600	44,100	55,200	?	
Great Britain	2,200	2,400	5,300	1,665	10,177	16,127	20,717	14,205	6,600	
Italy	73	112	330	483	1,658	2,749	3,100	3,300	?	
Japan	1,300	1,650	2,200	4,400	8,800	13,200	16,500	18,700	?	
Norway	—	—	—	—	100	2,200	2,200	2,200	?	
Switzerland	250	830	830	830	770	1,650	1,650	1,100	?	
U. S. S. R.	550	550	1,100	1,650	4,400	5,500	5,500	5,500	2,400	
United States	2,270	3,217	3,350	6,261	16,295	48,963	183,584	157,100	32,792	
Total	21,600	26,300	34,100	40,300	72,100	131,400	283,700	264,400	60,600	

Note: Figures ending with zero are estimates.

Table II.—Data of the Magnesium Industry in the United States
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Production	2,270	3,217	3,350	6,261	16,295	48,963	183,584	157,100	32,792
Sales	2,270	2,410	5,325	6,412	15,528	47,420	170,267	146,585	43,496
Secondary recovery	?	?	?	?	1,752	6,238	11,404	14,185	9,247
Exports	?	?	1,050	2,100	834	1,549	4,045	14,720	4,830
Available supply	?	?	1,360	3,225	5,527	13,979	43,375	155,547	141,755

The greater portion of the war expansion in the production of magnesium was made in the United States, where output was increased eightyfold between 1937 and 1943. Most of the increased capacity was in government-owned plants, the disposal of which became a problem after the war. It was recommended that 7 plants be disposed of for any available use, and that 6 others, with an annual capacity of 106,000 tons, be retained in operation by lease or sale, or kept in standby condition.

The war uses of magnesium were probably rather generally misunderstood. While casings and powder for incendiary bombs were an important factor, engine and structural parts for aeroplanes were the largest item; castings alone accounted for 80% of the 1944 consumption.

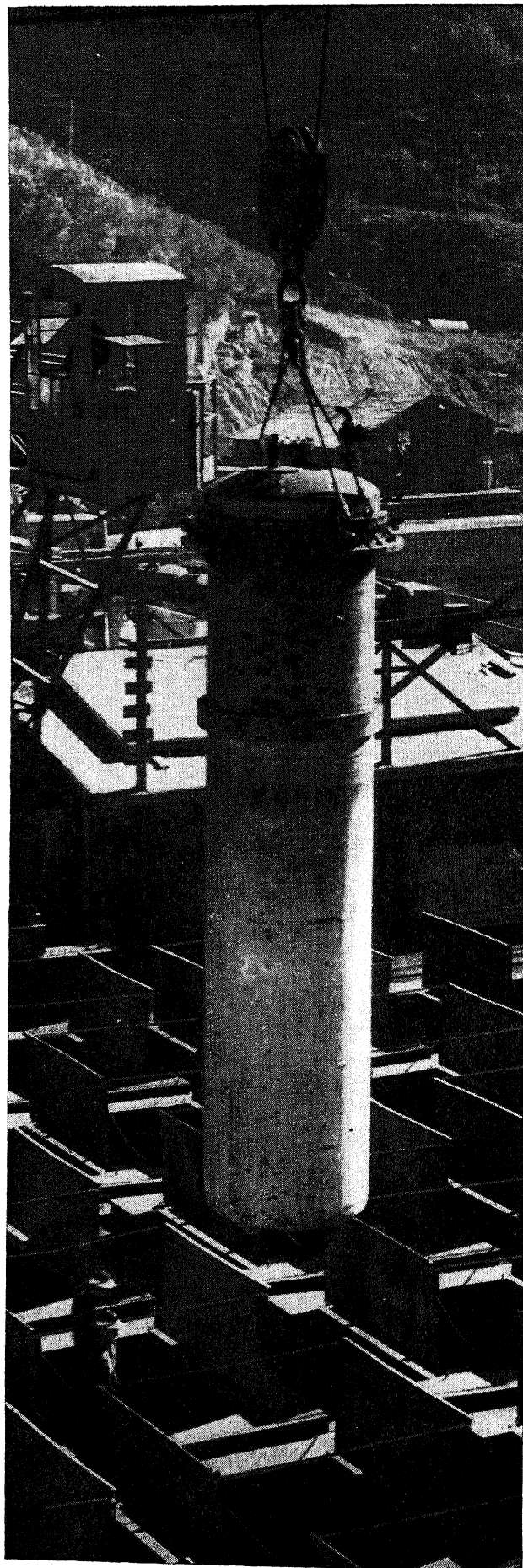
(G. A. Ro.)

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Magnesium Compounds

During the course of the decade, the raw materials used in the production of magnesium compounds were radically altered. Formerly the commercial forms of magnesium came almost entirely from crude magnesite, while magnesium chloride and other compounds were derived mainly from well brines. To these basic raw materials were added bruceite, dolomite, sea water bitterns, dry lake brines and raw sea water, from any of which almost any desired magnesium compound could be prepared by proper manipulation of the processing procedure.

Giant magnesium container being carried over retort furnaces at the plant of the Permanente Metals corporation near San Francisco. Managed by Henry J. Kaiser, the plant began full production in 1943



Since the major world producers of magnesite outside of the United States were the U.S.S.R., Austria, Manchuria, Greece and Czechoslovakia, little information could be given on foreign supplies, and attention centred on progress of the industry in the United States, where it was necessary to expand production to meet both expanding demand and declining imports. Total imports of all types of magnesium compounds decreased from 50,778 short tons in 1939 to 6,042 tons in 1945.

Production of Magnesium Compounds in the United States
(Short tons)

	Crude Magnesite	Caustic Calcined	Refractory	Total Magnesia	Other Compounds	Dead-burned Dolomite
1937	203,473	10,031	83,204	93,235	64,777	617,706
1938	97,000	7,400	38,738	46,138	70,733	366,626
1939	198,980	10,157	86,077	96,234	85,754	671,561
1940	333,166	16,261	140,668	156,929	108,266	867,909
1941	374,799	30,225	201,481	231,706	137,357	1,069,887
1942	497,368	41,889	273,661	315,550	296,885	1,229,357
1943	754,832	191,792	301,382	493,174	737,062	1,276,725
1944	561,450	139,243	278,490	417,733	608,151	1,290,790
1945	336,458	43,270	254,994	298,264	201,501	1,187,334

Production of the major types of magnesium compounds in the United States was as shown in the table.

(G. A. Ro.)

Magnetron

See PHYSICS.

Maine

The extreme northeastern state of the United States, Maine was admitted as the 29th state in 1820; popularly known as the "Pine Tree state." Land area 31,040 sq.mi.; water area 2,175 sq.mi.; population (1940) 847,226; rural 504,169; urban 343,057. Capital, Augusta (19,360). Other cities: Portland (73,643); Lewiston (38,598); Bangor (29,822). The population on July 1, 1944, was estimated at 793,600 by the U.S. bureau of census.

In Jan. 1937 Lewis O. Barrows was inaugurated governor; he had been elected in 1936 when only Maine and Vermont out of the 48 states remained Republican. In the same month three Republican congressmen, James C. Oliver, Clyde H. Smith and Ralph O. Brewster, former governor, took office. Senator Wallace H. White, Jr., was re-elected by a small majority over Louis J. Brann, retiring Democratic governor. For the first time since 1931, the whole Maine delegation at Washington, D.C., was again Republican. Perhaps the main political event of 1937 was the defeat by a majority of more than two to one at a state-wide referendum of a law proposing a sales tax to secure revenue for public schools and old-age pensions. The legislature passed legislation that for the first time set up a merit system for state employees. A special session of the legislature late in the year provided the necessary revenue for the schools and old-age pensions by increasing liquor taxes and reducing the appropriations of various state departments.

In the 1938 election, the Republicans increased their majority in the legislature, and re-elected Governor Barrows and three congressmen: Oliver, Smith and Brewster. The merit system law of 1937 was operating in only a few departments at the end of 1938, partly because of lack of funds. Northern Maine citizens formed a committee to study the feasibility of making Aroostook county the 49th state. The Maine Municipal association, only organization of its type in New England, completed its second year in 1938 with 171 cities and towns as members. In addition to its publication and advisory service, and its local and state conventions, it announced a new magazine, *The New England Townsman*.

The regular biennial session of the legislature, meeting

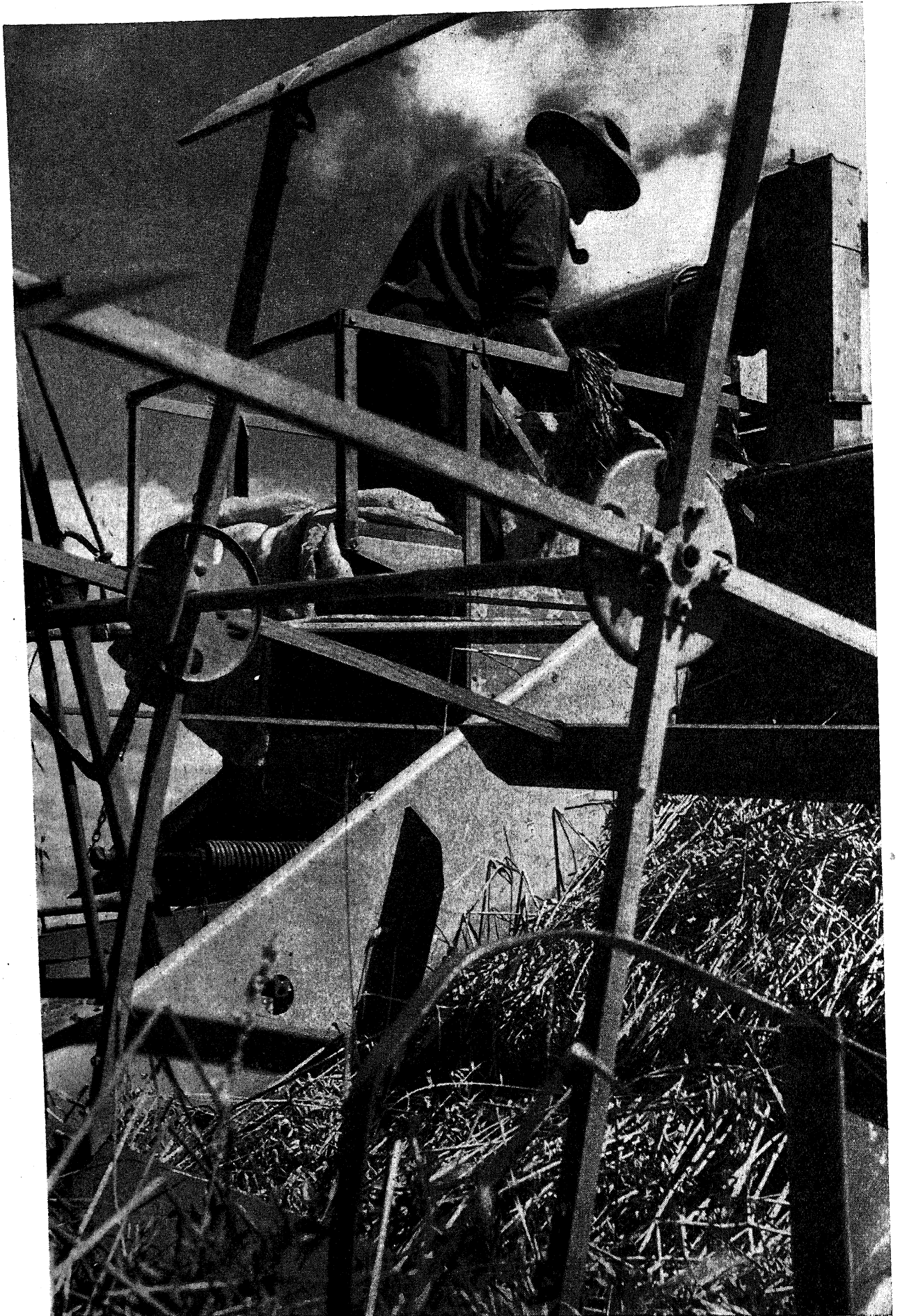
in 1939, decided to continue the state's narrow tax base, depending largely on auto, gasoline, liquor and real estate levies. No major bills were passed; the department of health and welfare was reorganized, and a host of minor bills and amendments were approved. Several municipalities were granted the right to adopt the manager form of government. Dog racing, lottery and liberal old-age pension bills were killed. A proposed constitutional amendment increasing the state debt limit to permit additional highway bonds was defeated by the voters in Sept. 1939. Old-age assistance appropriations were increased without passing any major tax bills, funds being procured from other sources.

In 1940 the *Bangor Daily News* claimed the credit for disclosures of irregularities and embezzlement after a private firm of auditors had checked the work of the state auditing department. On April 1, shortly before he was to testify, William Runnells, state controller, was found shot. Auditors reportedly discovered shortages in his accounts totalling more than \$157,000. As a result of the scandal and subsequent investigation, three high officials resigned and a permanent legislative investigating and research committee was created. Investigation disclosed widespread administrative inefficiency and disregard for the statutes. A defective administrative organization and the continuance of the spoils system appeared to be responsible.

Campaign charges of graft and inefficiency did not cause defeat of the well-entrenched Republican party in the 1940 election. Senate president Summer Sewall was elected governor by a vote of 162,719 to 92,003 on a platform promising honesty, economy and efficiency. In the same election (September), three Republican representatives and a senator were elected: Oliver (1st district) re-elected, Margaret Smith (2nd district) and Frank Fellows (3rd district). Representative Ralph O. Brewster won the senate seat vacated by Frederick Hale in the June (Republican) primary. Fewer Democrats were elected to the legislature than in 1938. An election surprise was the narrow Willkie margin of 163,951 to 156,478 votes for President Roosevelt in November, after the decisive Republican victory in September and the large majorities in 1932 and 1936. Maine was one of the few states where Roosevelt gained votes in 1940. The legislature met in special session in May, July and October.

Among controversial measures enacted by the regular session of the legislature in 1941 were a premarital examination law, a contributory pension bill covering state employees and a cigarette tax bill, the returns of which were earmarked for old-age assistance. Various tax rates were increased, including a half-cent-a-gallon rise in gasoline. The gas tax increase was defeated in a referendum election, and the governor vetoed the pension bill. The governor and his finance officers made changes in budgeting, accounting, and auditing procedures of the state, designed to improve efficiency and prevent financial scandals. The governor charged the liquor commission with inefficient and lax administration of the laws, and replaced all three members, with his former secretary as chairman. Senator Brewster took office in Jan. 1941 for a six-year term.

A special session of the legislature convened Jan. 12, 1942. A defense measure granted emergency powers to the governor and another authorized the issuance of war bonds. State employees receiving less than \$30 weekly were given a 10% raise, and a jointly contributory retirement system was established. The permanent legisla-



tive investigating committee continued its studies of state agencies and prepared a report for the 1943 legislature. Loss of state employees to federal agencies and war industries caused a critical shortage of workers in the state hospitals for the insane. Pay increases were granted to prevent a breakdown of state services. Republican governor Sumner Sewall was elected in Sept. 1942 for his second term. Senator White (Rep.) was re-elected for a full term. Republican representatives Margaret C. Smith and Frank Fellows were re-elected; Robert Hale defeated James C. Oliver in the June primary and former Democratic governor Brann in September. Balloting was the lightest since 1930.

The 1943 regular session of the legislature met from Jan. to April. Most of the bills passed were concerned

with routine matters or amendments to existing laws. Fish and game laws were simplified and a postwar planning fund established. The state personnel board granted a general pay increase in all departments, after the legislature had appropriated larger amounts for personal services for the biennium beginning July 1, 1943. Numerous individual increases were also granted, but rapid turnover and shortages continued to be serious, especially in state institutions.

Two special sessions of the state legislature met in 1944, one in April and one in Sept. In the September election Horace A. Hildreth (Rep.), president of the state senate, was elected governor to succeed Sumner Sewall. The voters approved an amendment to the state constitution which segregated automobile and gas taxes for highway purposes. Thomas E. Dewey carried the state in November in his bid for the presidency, by a vote of 155,434 to 140,631 for Franklin D. Roosevelt.

The regular session of the legislature met from Jan. to April, 1945, with George D. Varney as president of the senate and George Barnes as speaker of the house. Veterans' preference legislation and postwar public works plans were enacted. Horace A. Hildreth (Rep.) took office as governor (1945-46 term). Five Republicans served in congress: Robert Hale, Margaret Chase Smith, Frank Bellows in the house; Wallace H. White, Jr., and Owen Brewster in the senate.

Governor Hildreth was re-elected in the election of Sept. 1946, for the 1947-48 term. Republicans retained control of the 151 member house and the 33 member senate. A sales tax-soldier's bonus measure enacted at a special session of the state legislature was defeated by referendum. (E. F. D.; X.)

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Maize

See CORN.

Makin, Norman John Oswald

Makin (1889–), Australian statesman, was born March 31, 1889, at Petersham, New South Wales. The son of impoverished parents, he was forced to leave school in his youth and worked as delivery boy, bookseller and patternmaker. Becoming active in Labour party politics, Makin was elected in 1919 to the Australian house of representatives as member from Hindmarsh. He was speaker of the house from 1929-32 and was president of the Labour party in 1936. A member of the Advisory War council in 1940, Makin was appointed minister of the navy and munitions in Curtin's Labour cabinet in Oct. 1941; in 1945 he also was given the additional portfolio of minister of aircraft production.

Makin headed the Australian delegation that attended the United Nations Security council sessions in London. On Jan. 15, 1946, he declared that the atomic bomb should be placed at the disposition of the Security council's police force which under the charter would be designed to keep the peace. At the first meeting of the Security council Jan. 17, 1946, he was elected president under the alphabetical rotation plan.

Malacca

See MALAYAN UNION.

Maine: Statistical Data

Table I.—Education (Public)

	1936	1938	1940	1940-41	1942-43	1943-44
Elementary school pupils	129,147	126,255	133,718	122,528	156,591	152,788
High school pupils	37,360	37,761	37,716	46,121		
Elementary teachers	5,049	4,745	5,978	6,899	5,817	5,703
High school teachers	1,440	1,457				

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Number of cases on general relief	13,900	12,279	10,131	9,924	6,898
Cost of general relief	\$325	\$287	\$207	\$245	\$147
Recipients of old-age pensions		11,948		13,909	12,502
Cost of old-age pensions		\$248		\$300	\$261
Dependent children receiving aid		3,465		3,897	3,864
Blind receiving aid		1,252		1,233	1,071
Workers under unemployment compensation			134,364	142,791	139,000

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1945
Highway mileage		8,771	8,771		
Expenditure on highways	\$16,360	\$14,523	\$14,069	\$13,550	\$8,937
Railroad mileage	1,912	1,898	1,881		2,778

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1944	1945
State revenue	\$29,519	\$32,607	\$33,919	\$43,823	\$41,243	\$42,775	\$42,102
State expenditure	28,017	31,564	26,950	43,462	41,208	30,441	31,489
Number of national banks	39	39	38	37		35	34
Deposits of national banks	116,777	113,611	119,890	125,342			242,067

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1944	1945 (est.)
Income from crops and livestock	\$60,900	\$51,675	\$53,359			
Leading crops (bu.)						
Apples	769	1,068	752	813	912	132
Barley	112	116	120	112	84	84
Beans, dry (100 lb.)	80	91	70	4 (tons)	2 (tons)	2 (tons)
Buckwheat	165	117	120	119	120	93
Corn	370	546	507	672	640	600
Hay (tons)	863	918	877	901	735	919
Oats	3,955	4,598	4,520	4,017	3,515	2,916
Potatoes	47,600	37,260	44,055	42,660	52,260	52,785
Wheat	76	84	88	40	40	36

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	75,464	75,656
Wages paid	72,263	68,434
Value of products	348,636	345,369

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1942	1943	1944
Leading mineral products:						
Stone	\$1,456	\$1,229	\$1,162	\$557	\$410	\$333
Sand and gravel	707	969	889	800	734	710
Clay	359	211	372	300	120	
Silica (quartz)	168		216			
Feldspar (crude)	111	68	74	53	42	48
Slate	389		216			

Small-acreage farmer near Augusta, Me., threshing oats, second leading agricultural product of the state. Potatoes remained first throughout the decade 1937-46

74. **Malaria**

See CHEMISTRY; EPIDEMICS AND PUBLIC HEALTH CONTROL; MILITARY MEDICINE.

Malaya, British

See MALAYAN UNION; WORLD WAR II.

Malayan Union

The area known as British Malaya was divided, at the beginning of the decade 1937-46, into three classes of territory known severally as the Straits Settlements, the Federated Malay States and the Unfederated Malay States. The Straits Settlements, which ranked as a British colony, comprised the islands of Singapore, Penang, Christmas, Labuan and Cocos, as well as the peninsular districts of Malacca and Province Wellesley. The Federated Malay States were four in number (Perak, Selangor, Negri Sembilan and Pahang), all situated on the mainland of the Malayan peninsula. The Unfederated Malay States (Johore, Kedah, Perlis, Kelantan, Trengganu and Brunei) were also situated on the mainland with the exception of Brunei, which formed part of the island of Borneo.

British relations with all these various classes of territory were conducted through a single officer who combined the functions of governor of the Straits Settlements with those of high commissioner for the Malay states, and, in a third capacity as British agent, served as the channel of communication between the British government and the states of Sarawak and North Borneo (see BORNEO, BRITISH). In the Settlements the governor's functions were similar to those of other colonial governors. He was directly responsible for the administration of territory under full British sovereignty. In the Malay states the position was not quite so simple. British rights and obligations were defined in every case by a formal treaty concluded with the sultan concerned. The various treaties were drawn in very similar terms. Broadly speaking, each sultan was required under treaty to accept the advice of the British crown, as conveyed through the high commissioner, in all matters not affecting Malay custom or the Mohammedan religion. The high commissioner's authority was exercised in each state through a local representative known in the Federated Malay States as British resident and in the Unfederated Malay States as British adviser. In the Federated Malay States, the high commissioner communicated with the British resident and the state administrations through an officer known as the federal secretary whose sphere covered the whole federation but who exercised no executive authority in any but federal matters. The whole machine was a somewhat complicated one; but it had grown up in conformity with local needs and traditions and worked smoothly enough in normal times and in normal circumstances.

Total area of British Malaya: 53,222 sq.mi. (Straits Settlements 1,356 sq.mi., Federated Malay States 27,540 sq.mi. and Unfederated Malay States 24,326 sq.mi.). It is situated in the southern portion of (and islands adjacent to) the long strip of territory known as the Malay peninsula, which runs southward from the main Asiatic continent to a point just north of the equator.

Total pop. (1931 census) 4,383,850 (1941 est. 5,560,444); (Straits Settlements 1,114,015 (1941, 1,420,841); Federated Malay States 1,713,096 (1941, 2,193,605); Unfederated Malay States 1,556,739 (1941, 1,889,648). Principal racial elements (1931): Malays, Chinese and Indians. Taking the country as a whole: Malays 1,872,000, Chinese 1,709,000,

Indians 624,000. The racial percentages to total population in the various classes of territory were as follows: in the Straits Settlements, Malays 26%, Chinese 60%, Indians 12%; in the Federated Malay States, Malays 35%, Chinese 41%, Indians 22%; in the Unfederated Malay States, Malays 70%, Chinese 21%, Indians 7%. In the city of Singapore the Chinese represented about 74% of the population.

Chief towns: Singapore (headquarters of the governor of the Straits Settlements and high commissioner for Malaya) (pop. 544,000 in 1931; 1941 est. 760,226); Kuala Lumpur (local headquarters of the administration of the Federated Malay States) (c. 140,000; 1939, 138,425); Ipoh (67,000); and Taiping in the Federated Malay States (39,000); Johore Bahru (cap. of Johore, the largest of the Unfederated Malay States) (27,000); Brunei (1937 est. 10,453). Languages: Malay, Chinese, Indian languages and English. Religion: Mohammedan, Hindu, Buddhist and Christian.

Sir Shenton Thomas assumed office as governor of the Straits Settlements and high commissioner for the Malay states on Nov. 9, 1934. On the fall of Singapore (Feb. 15, 1942) he fell into Japanese hands and remained a prisoner for the rest of World War II. From the British reoccupation (Sept. 1945) to the end of March 1946, Malaya was under military administration. In April 1946, as part of the postwar reconstruction of British civil authority in the area, Sir Edward Gent was appointed governor of the Malayan Union and Sir Franklin Gimson governor of Singapore. In May 1946 Malcolm MacDonald was appointed governor-general with a sphere of authority covering all British territories in Malaya and Borneo.

Wealthy Malaya.—Malaya, at the beginning of the decade, was one of the richest areas in the British colonial empire. Its two chief products—far outweighing all others in magnitude and importance—were tin and rubber. In respect of rubber the country, though it had a close rival in the Netherlands East Indies, could claim to be the largest producing territory in the world. It was estimated that, at the end of 1937, the total area under rubber was 3,273,000 ac. The Malayan production of tin was also greater than that of any other country, the Netherlands East Indies again being the nearest rival. Malaya's output of tin ore was estimated in 1937 at 37% of the total world production of 228,690 short tons. The tin-mining industry was one in which both Europeans and Chinese were interested. About 70% of the mines were operated by European concerns (in which the Chinese also had shares) and the remaining 30% by Chinese firms. The labour employed in the mines was, and had been for many years past, predominantly Chinese. Labour on the rubber plantations was confined for the most part to immigrant Indians whose general practice was to reside on the estates for a limited number of years and eventually to return to India. The Malay community, which by 1940 had fallen slightly below the Chinese in point of number, played little active part in the immense industrial progress which the country had achieved. The Malay was seldom a wage earner by choice. He preferred to preserve his independence and tended, notwithstanding the rapid industrial development that was going on all round him, to carry on traditional occupation as a fisherman or (more usually) as a farmer cultivating his rice, coconuts and vegetables, and increasing his cash income when he found it desirable to do so by tapping his own rubber trees. Nine out of every ten Malays lived in the rural districts of the country. Insofar as they had taken to wage earning (a comparatively late development), they found employment in supervisory rather than in manual labour. Many were employed as



Rice for hungry British Malays was brought by R.A.F. Sunderland flying boats during an acute rice shortage in 1945. Native boatmen are shown unloading a shipment

policemen, watchmen, tally clerks or in some similar occupation.

Among the more important questions that came to the front during the early years of the decade was that of providing improved facilities for higher education in Malaya. With a view to dealing with the matter comprehensively the British government sent out a special commission from England whose terms of reference covered all aspects of higher education in the country and particularly the work of Raffles college, Singapore (an institution established in 1929 to provide advanced instruction in English). The commission was also instructed to inquire into the possible development of a university for Malaya. It reported in June 1939, some three months before the outbreak of World War II. The conclusion reached was that the day had not yet arrived for the establishment of a fully-organized university, but the recommendation was made that, with that ultimate object in view, preliminary steps should be taken without delay for the fusion of Raffles college and the Medical college at Singapore into a single University College of Malaya controlled by a joint principal. The intervention of the war prevented further development along the lines proposed.

Malaya had never been looked upon as a recruiting ground, on any considerable scale, for the armed forces of the British empire. But there were military developments of some importance in the country during the years immediately preceding the war. A regular Malayan regiment was raised as an experimental measure at the expense of the Federated Malay States. At the outbreak of the war, it was regarded as having passed the experimental stage and was declared fit for active service. It played its part, not without credit, in the disastrous Malayan campaign. Little use was made of the Chinese community for military purposes. The failure to tap this source of recruitment was one of the reproaches brought against the British authorities after the fall of Singapore. Plans for the formation of Chinese labour units were under active consideration at one stage, but they had not been carried into effect by the time that Malaya became a theatre of hostilities.

Sense of Security.—The outbreak of World War II did

not, in the initial stages, produce any very pronounced effect upon the general situation in British Malaya. The region was far removed from the scene of active hostilities and must have seemed to its inhabitants in those early days to be as secure from the shocks of battle as any country in the world. There was little immediate increase in recruitment for military service. The view taken by the British government was that the primary function of Malaya was not to provide recruits for the armed forces but to stimulate by all possible means the production of tin and rubber, both of which were commodities regarded as vital to the Allied war effort. In addition to concentrating upon this all-important object, Malaya made other valuable contributions to the general war effort during the first two years of hostilities. The Malay sultans set an example of princely generosity in their pecuniary gifts to the British exchequer. In all, a total of about £20,000,000 was raised in Malaya as a whole for purposes connected with the prosecution of the war. It was made up of contributions in which members of all races—rich and poor alike—took their share. The amount subscribed in the country represented two-thirds of the total contribution of the British colonial empire. A local defense corps was raised in which men of all races served side by side. Between 80% and 90% of the European male community was embodied in active and passive defense organizations.

Whatever may have been the initial sense of security in Malaya, it received something of a shock when France collapsed in June 1940, leaving French Indo-China, one of Malaya's nearest neighbours, exposed to Japanese influence and infiltration. This was, in fact, though it may not have been fully recognized at the time, a turning point in Malayan war history. Free access to French territory proved an immense asset to the Japanese. It enabled them to establish a strong position in the neighbouring territory of Siam (Thailand) and so to acquire a base from which, when the time arrived, they could direct their attack upon Malayan territory with the maximum effect. For many months after the fall of France the intentions of the Japanese remained uncertain. British relations with Japan were critical throughout this period, but there were times when the danger of an armed conflict seemed to have receded into the background. The situation changed almost

from day to day, and hopes of a peaceful settlement—doomed in the end to disappointment—were maintained up to a very late date. During the autumn of 1941, the British government, seriously disquieted by the general situation in the far east, took steps for the better co-ordination of their interests throughout the whole area. For this purpose a British minister of cabinet rank (Alfred Duff Cooper) was appointed resident minister for far eastern affairs with headquarters at Singapore and with general authority to direct British policy (subject to the instructions of the London cabinet) and to furnish political advice to the British naval and military high command in the far eastern theatre. Duff Cooper's assumption of office synchronized almost exactly with the outbreak of hostilities in the far east. He held the post for a bare month; with the creation of a unified command for the whole of the Southwest Pacific area, with General Sir Archibald (later Field Marshal Viscount) Wavell as supreme commander, it was considered that there was no longer any scope for the activities of a resident minister, and Duff Cooper was accordingly recalled to England. He left Singapore on Jan. 13, 1942.

Malaya Doomed.—On Dec. 7, 1941, while negotiations between Japan and the United States were still in progress at Washington, the Japanese air force delivered a surprise attack on the U.S. naval base at Pearl Harbor. That meant war with Great Britain as well as with the United States. The Japanese were prompt to act against Malaya. Singapore received its first air raid in the morning of Dec. 8, and on the afternoon of the same day a Japanese landing was repulsed on the Malayan coast. Two days later the British battleship "Prince of Wales" and battle cruiser "Repulse" were attacked and sunk by Japanese aircraft, Admiral Sir Tom Phillips, the recently appointed British naval commander in chief in the far east, going down with his ship. The practical effect of these two incidents—the attack on Pearl Harbor and the destruction of the British battleships—was to cripple Anglo-American sea power in the Pacific for many months to come. Having acquired predominance both at sea and in the air, the Japanese were not slow to press forward their campaign of aggression.

In Malaya the first serious British reverse occurred when the island of Penang had to be evacuated on Dec. 18, 1941. Ipoh, the centre of the tin industry, fell on Dec. 29. Kuala Lumpur was occupied on Jan. 10, 1942. By Jan. 14, 1942, the British retreat had reached as far south as the northern border of the Johore state. Later, the British troops fell back upon Singapore Island where the Japanese made their first landings on Feb. 8. By Feb. 13 the city of Singapore was closely invested and its water supply was cut off. On the 15th it surrendered unconditionally.

The fall of Singapore was one of the most resounding reverses ever sustained by British arms. The great maritime fortress, on the construction of which immense sums had been expended, and which was believed to be virtually impregnable from the sea, had proved powerless to resist a determined overland attack. The general consternation that resulted led, as was perhaps only to be expected, to much hasty and ill-considered criticism. The criticism was not confined to the military conduct of the campaign. The civil authorities in Malaya were accused of incompetence and lack of foresight and resolution; the Asiatic community—or at least some sections of it—of "fifth-column" activities and of rendering assistance to the Japanese in the field. The agitation died down in the course of time, as such agitations do. The accusations against the British au-

thorities lacked substance; and subsequent investigations proved that the charges of "fifth-columnism" against the Asiatics rested upon the flimsiest foundation. They also brought to light a number of cases in which the local inhabitants—both Chinese and Malays—had rendered devoted help to isolated British units in the course of the campaign. In Singapore itself the Chinese community—without distinction of party—did invaluable work in the sphere of civil defense. The story of the Malayan campaign may be summed up in a single sentence. The Japanese had gained control, for the time being, both of the sea and of the air; against that combination there could be no adequate defense. (See WORLD WAR II.)

Iron Curtain.—With the capture of Singapore an iron curtain fell across the Malayan scene and was not lifted again for three and one-half years. As a Japanese-occupied territory Malaya underwent experiences similar to those of other eastern territories that came under Japanese control. Trade was stifled because markets and shipping were not available. Industry languished. The whole economy of the country was dislocated by the inefficiency and corruption of the military bureaucracy. Mechanical, cultural and economic interests were systematically neglected. Outside the island of Singapore, and more particularly in the rural districts of the mainland, medical and health facilities, built up at great expense and raised to a high standard of efficiency by the British authorities, suffered a disastrous setback. The Asiatic community had to reconcile itself to an alien regime, which on the whole was apparently more favourable to the Malays than to the Chinese. What they felt about it all could best be inferred from the enthusiasm with which, when their long ordeal at length ended, they welcomed the returning British troops. The European community, cooped up in internment camps behind barbed wire entanglements, did their best to maintain

Singapore merchant displaying unrationed silks and other fabrics to a group of British sailors shortly after the close of World War II



some semblance of civilized life both for themselves and for those Asiatics who were their fellow prisoners. In the matter of education, remarkable work was accomplished. Camp schools were set up both for boys and girls. Small committees of school teachers drew up an appropriate syllabus. It was even found possible, during the later stages of internment, to hold school certificate examinations for qualified candidates. The first was held in Jan. 1945 and the second in the following August. A full report of the two examinations was submitted to the Cambridge examination syndicate, which agreed to accord recognition to the results achieved. Much valuable work was also done, under conditions of the greatest difficulty, in medical and health matters. Efforts were made by British medical personnel to maintain a minimum health service in the city of Singapore and by that means to control the spread of epidemics. In fact, the city suffered less during the time of Japanese occupation than might have been expected. A report drawn up shortly after the British reoccupation in Sept. 1945 showed that the general health position was surprisingly good except for a rapidly increasing incidence of tuberculosis and malaria. Malaria showed some signs, which were happily not borne out by the event, of developing into a serious epidemic. Sanitary services deteriorated greatly under Japanese rule, but taken as a whole the death rate at Singapore was not greatly in excess of what had been recorded in specially unhealthy years before the war.

Peaceful Reconquest.—During the first half of 1945, the tide of war in the far east went steadily against the Japanese. By May 3 their expulsion from Burma was virtually complete. Plans were in preparation for a large-scale Allied expedition for the reconquest of Malaya. It was revealed after the war by Admiral Lord Louis Mountbatten, who was in supreme command of the forces in this area, that 250,000 men, with full air support, would have taken part in the attack. As it happened, no such action was found necessary. Japan surrendered on Aug. 14, 1945. On Sept. 5, 1945, British, Indian and Gurkha troops landed at Singapore. They met with no opposition and the re-establishment of British authority in Malaya was peacefully and rapidly effected. The returning British troops received a warm welcome from all sections of the population.

For many months before the end of the war the British government had been engaged in formulating plans for the future administration of Malaya after the ejection of the Japanese forces. An official statement on the subject, foreshadowing political changes of a far-reaching character, was made in the British house of commons on Oct. 10, 1945, scarcely more than five weeks after the reoccupation of Singapore. On that occasion the secretary of state for the colonies laid special emphasis on the "need to promote the sense of unity and common citizenship which will develop the country's strength and capacity in due course for self-government within the British commonwealth." With this object in view it was proposed to create a constitutional "union" of Malaya and to institute a Malayan citizenship which would give equal rights to all persons claiming Malaya as their homeland. The Malayan Union was to include all the nine states in the Malayan peninsula as well as the two British settlements of Penang and Malacca. The town and island of Singapore were to be treated separately in the first instance.

New Union.—To carry these proposals into effect it was necessary to conclude new agreements with the Malayan sultans conferring full jurisdiction over their territories upon the British crown. A special representative was sent

out to Malaya, who lost no time in negotiating new treaties with the rulers, both federated and unfederated. An announcement to this effect was made in the British parliament on Jan. 23, 1946. Further action followed without delay. As soon as the period of British military administration came to an end (April 1, 1946) Malaya was grouped under two governments: the first known as the government of Singapore (covering the previous settlement of that name and including Cocos and Christmas islands as well as the island of Singapore itself), and the second as the government of the Malayan Union, comprising the nine Malay states of the peninsula and the British settlements of Penang (including Province Wellesley) and Malacca. Kuala Lumpur was chosen as the capital of the union. A governor was appointed to each of the two territories; and a new post was created—that of governor-general—to co-ordinate and direct the policies not only of Singapore and the Malayan Union but also of Sarawak and North Borneo, those two territories having become the direct responsibility of the British government. The first incumbent of the post of governor-general was Malcolm MacDonald, an ex-secretary of state for the colonies and son of the former British prime minister. He assumed office in May 1946.

Meanwhile, the new policy had aroused considerable criticism both in Malaya and in Great Britain. There was adverse comment on the rapidity with which the new treaties with the Malayan sultans had been concluded. The sultans themselves, though they had signed the revised treaties, complained later that they had been induced to act with precipitation and had not fully appreciated the implications of their action. In particular, the provisions in regard to citizenship of the Malayan Union were the subject of much opposition. It was urged that they were unfair to the Malay community in that they placed two sections of the population, viz., the Malays themselves, whose interests were wholly bound up in Malaya, and the Chinese, who retained Chinese nationality under the laws of China and in many cases were associated with Malaya only temporarily, on too level a footing.

In response to this criticism the British government, while declaring its continued adherence to the principle of common citizenship, gave an understanding on March 8, 1946, that the new citizenship would not actually be brought into effect until there had been opportunity for full local discussion of the terms on which it should be granted. As already stated, the Malayan Union came into existence on April 1, 1946, but opposition from the sultans and from Malay political leaders continued to develop. In an endeavour to solve these difficulties in a friendly and constructive manner, the sultans and Malay leaders were persuaded by the governor-general and the governor of the Malayan Union to enter into discussions, the scope of which it was intended to extend later so as to include representatives of all important communities in Malaya. Once inaugurated, the discussions proceeded on their course, but no final decisions had been reached by the end of 1946.

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British Malaya: Statistical Data, 1938

Item	Value (000's omitted)	Amount or Number
Exchange rate		1 Straits dollar* = 2s. 4d. (\$6.91 cents U.S.)
Finance		
Government revenues	£15,278 (\$74,739)	
Government expenditures	£20,835 (\$101,860)	
National debt	£12,028 (\$58,804)	
Transportation		
Railroads		1,068 mi.
Highways		8,575 mi.
Communication		
Telephones		7,673
Radio Sets		13,516
Minerals		
Tin ore (metal content)		48,265 tons
Iron ore		1,770,625 tons
Tungsten ore (metal content)		2,204,600 lb.
Gold		40,794 oz.
Tin ore		72,172 tons
Crops		
Rubber		404,206 tons
Rice		334,880 tons
Coconuts		132,041 tons†
Livestock		
Swine		830,240
Oxen		317,470
Goats		301,120
Buffaloes		229,224
Forest Products		
Timber		23,257,900 cu.ft.
Firewood		14,145,900
Charcoal		4,902,900 "
Exports		
Total	£66,279 (\$324,037)	...
Rubber	£31,780 (\$155,372)	...
Tin metal	£11,216 (\$54,833)	...
Motor Spirit	£4,133 (\$20,204)	...
Rice	£1,559 (\$7,621)	...
Imports		
Total	£63,636 (\$311,114)	...
Rubber	£8,653 (\$42,306)	...
Rice	£6,266 (\$30,634)	...
Motor spirit	£5,327 (\$26,046)	...
Tin ore and concentrates	£3,499 (\$17,108)	...
Education		
Federated Malay		
States English Schools		46†
Students		17,229†
Vernacular Schools		1,392†
(Malay, Tamil, Chinese)		
Students		107,081†
Unfederated Malay		
States English Schools		27†
Students		3,775†
Vernacular Schools		719†
(Malay, Tamil, Chinese)		
Students		59,978†
Muslim Religious Schools		102†
Students		8,754†

*£ sterling also used.

†Exports only.

‡1937.

Malinovsky, Rodion Yakovlevich

Malinovsky (1898-) Soviet army officer, was born in Odessa of peasant parents and was drafted in the tsarist army in World War I. He served in 1915 with one of the Russian brigades in France, fighting beside British and U.S. troops in the Amiens-Arras-Reims region. Malinovsky left France for Russia to take part in the bolshevik revolt of 1917. After serving as an officer during the civil war, he returned to Odessa. Soon he was back in the army, however, and when World War II broke out he held the rank of major general and was commander of the soviet 6th army. In 1941 Malinovsky was forced to abandon

Dnepropetrovsk before the nazi advance; he later personally led the forces which recaptured the city. He beat off German attempts to relieve trapped German troops in Stalingrad in 1942, and was promoted to the rank of colonel general and given command of the entire southern front. While commanding the 3rd Ukrainian army in 1943-44, Malinovsky evicted the Germans from the southern Ukraine. In 1944 his armies drove into Bucharest, and in September, he signed the United Nations armistice with Rumania. He was promoted to the rank of marshal at this time. In Dec. 1944 he spearheaded the soviet drive into Hungary. Budapest fell in Feb. 1945, and by April the 3rd Ukrainian force had driven into Czechoslovakia. After the war in Europe, Malinovsky was sent to Siberia, where he commanded one of the soviet armies which invaded Japanese-held Manchuria in Aug. 1945.

Malta

Malta (95 sq.mi.) and Gozo (26 sq.mi.) are much the largest and most important of a group of islands situated in the central Mediterranean, about 58 mi. from the nearest point in Sicily and 180 mi. from the nearest point on the African mainland. Civilian pop. of island group: (1931 census) 241,621; according to a census of April 1946, based upon food rationing figures, the total population was 285,130 (including 540 British service personnel drawing civilian rations). Chief towns (1931 census): Valletta, including suburbs (cap. 51,898); Senglea, Cospicua and Vittoriosa (combined pop. 27,149); Città Vecchia or Notabile, including the adjoining town of Rabat (pop. 10,032). Language, Maltese; English and Italian also widely spoken. Under letters patent issued in 1936 English and Maltese (to the exclusion of Italian) became the official languages of the colony. Religion: Roman Catholic. Governors (with dates of assumption of office): Gen. Sir Charles Bonham-Carter (April 16, 1936); Lieut. Gen. Sir William Dobbie (June 17, 1941; he had been administering the government as officer in command of the Malta forces since the previous year); Gen. Viscount Gort (May 7, 1942); Lieut. Gen. Sir Edmond Schreiber (Sept. 26, 1944); F. C. R. Douglas (after July 10, 1946).

At the opening of the decade 1937-46, Malta was passing through a difficult phase in its political and constitutional development. The constitution of 1921 gave the colony responsible government in its domestic affairs. Imperial questions remained the concern of the imperial authorities, but in all purely Maltese matters the administration was conducted by a Maltese ministry, depending upon the support of a party majority in an elected legislative body. The system broke down after about 12 years' experience. Matters reached a point at which the British government felt compelled to intervene. Italian intrigues and encroachments, unchecked by the Nationalist party then in office, had been carried to intolerable lengths. Drastic action had to be taken. The constitution of 1921 was suspended in 1933 and subsequently revoked in 1936. A new constitution was introduced in 1939, framed on lines appropriate to a wholly nonself-governing colony. Full power rested with the governor, advised by executive and legislative bodies. Malta's progress along the path of self-government had received a decided check.

That was the position when World War II broke out in Sept. 1939. During the first few months of the war Malta did not find itself directly threatened; but the situation was entirely changed in the early summer of 1940 when Italy entered the war and the central Mediterranean became a first-line theatre of operations. Malta, lying within such close range of Italian territory, was highly

vulnerable to axis attack. The first air raid upon the island was delivered on June 11, 1940; and thereafter the assaults continued, almost without intermission, for the best part of two and a half years. Matters reached a climax in Feb. 1942 when the island was subjected to continuous attack and there were sometimes as many as 13 alerts in a single night. There was a series of heavy raids during the following April.

The worst of the campaign was over by the end of 1942; by that time it was estimated that about 16,500 tons of bombs had been dropped upon Malta, that about 25,000 buildings had been destroyed or damaged and that civilian casualties amounted to 5,146 (1,469 killed and 3,677 injured). Even in the early stages, the axis by no means had matters all its own way. Thirty-seven axis aircraft were brought down in raids during Jan. 1941, and 16 more were destroyed in a raid in the following March. The axis sustained a heavy defeat on March 10, 1942, when it was estimated that no fewer than 93 of its aircraft were put out of action.

Throughout the prolonged ordeal the spirit of the defenders remained unbreakable. Apart from the loss of life and damage to property caused by repeated air attacks, Malta suffered from other hardships and discomforts inseparable from a state of siege. The maintenance of its food supply became a matter of extreme difficulty. The convoy of supply vessels from the United Kingdom and elsewhere grew more and more hazardous an adventure. There were cases in which convoys suffered a loss of more than 50%. Nevertheless, the task of provisioning was successfully accomplished in the face of all difficulties, and the danger of starvation was averted. An admirable system of air-raid shelters, many of them out of the living rock, reduced civilian casualties to a minimum. Under the leadership of Gen. Sir William Dobbie and later of Lord Gort, the garrison, both British and Maltese, held out against every onslaught, and the morale of the civilian population never wavered. Their steadfastness and fortitude were officially recognized on April 15, 1942, when the British sovereign bestowed the George cross upon the "Island Fortress of Malta."

Under the stress of siege conditions the constitutional question receded into the background. But it re-emerged in the first half of 1943. The existing legislature, formed under the constitution of 1939, was due for dissolution in July. War conditions made it necessary to extend its term of service, and this extension led to a demand from all political parties in the island for some indication of the future intentions of the British government. In the light of their conduct in the day of adversity, the claims of the Maltese to resume control over their own affairs could no longer be contested. Italian intrigues, which had played so conspicuous a part in the events of 1933, no longer counted. On July 13, 1943, a categorical assurance was given in the British parliament that responsible government would again be conferred upon the colony after the conclusion of the war; and that, in the meantime, early steps would be taken to consult Maltese opinion as to the precise form of the future constitution.

A congress, convened with an object of setting up a national assembly to draft a new constitution for the colony, met in Malta on Feb. 10, 1944. Its proceedings did not advance very rapidly, and it was not until nearly a year later, Jan. 20, 1945, that a national assembly, consisting of 388 members representing all sections of the population of Malta, held its first meeting in the Hall of St. Michael and St. George in the Palace of Valletta. The assembly was confronted with many difficulties from the

outset, not the least of which was the financial position of the colony consequent upon the heavy material damage sustained during the siege. Later in the year the British government sent out a financial expert to investigate the finances of the local government. A free grant of £10,000,000 for purposes of restoration of war damage and the rebuilding of Malta after the war had been approved in the closing months of 1942. In the light of the financial expert's report, it became evident that this amount must be largely increased; and it was officially announced in July 1946 that the British parliament would be invited to provide a further sum of £20,000,000 for the same purpose. It was also announced that legislation would be introduced to enable Malta, after the introduction of responsible government, to continue to benefit from the provisions of the Colonial Development and Welfare act; and that a sum of £1,000,000 per annum would be allocated to the colony as its share of the financial benefits furnished by the British treasury under the act. A commissioner was also sent out from England to assist the local representatives in framing the new constitution.

The appointment of a civilian governor of Malta in July 1946 marked a departure from long-established practice. Prior to the war the British colonial empire included three "garrison" colonies—Malta, Gibraltar and Bermuda—where officers of high military rank were regularly appointed to the governorship. The practice was first broken in the case of Bermuda in Oct. 1941. Malta followed suit nearly five years later.

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Malta: Statistical Data				
Item	1938		1944	
	Value (000's omitted)	Amount	Value (000's omitted)	Amount
Finance				
Government revenues . . .	£1,302 (\$6,365)		£4,026 (\$16,246)	
Government expenditures . .	£1,349 (\$6,597)		£3,732 (\$15,058)	
Transportation				
Highways		521 mi.†		
Crops				
Fodder crops		41,998 tons		22,400 tons
Potatoes		31,416 "		20,955 "
Onions		10,251 "		...
Livestock				
Goats		34,470		39,963
Sheep		15,936		24,389
Exports—Total	£219 (\$1,071)	...	£67* (\$271)	...
Potatoes	£117 (\$571)	13,339 tons	£16* (\$65)	466 tons*
Onions	£25 (\$124)	4,910 "	—	—
Hides and skins	£18 (\$88)	469 "	£21* (\$85)	108 tons*
Imports—Total	£3,866 (\$18,903)	...	£9,108* (\$36,752)	...
Wheat	£233 (\$1,137)	36,589 tons	£1,164* (\$4,696)	50,888 tons*
Metals and manufactures . .	£214 (\$1,044)	...	£292* (\$1,179)	...
Coal	£161 (\$785)	140,193 tons	—	—

*1945.

†1940.

Man, Isle of

See ISLE OF MAN.

Manchester

City, municipal county and parliamentary borough, Lancashire, England, Manchester is 189 mi. N.W. of London, and 31 mi. E. of Liverpool. Pop. (est. 1945) 624,300 (1938 est., 732,900). During 1937–46, Manchester consolidated its position as the capital city of provincial Britain.

Parallel with some reduction in cotton business, there were more than corresponding increases in heavy and light engineering and chemicals; government departments and the British Broadcasting corporation chose Manchester as their regional centre; the university began to be the focal point of the north's education; the medical services, general, specialist and hospital, were unrivalled in the United Kingdom outside London, and cancer research at Christie hospital was of world importance.

In 1938 the centenary of the incorporation of the city was celebrated by an exhibition and commemorated by the publication of Dr. Arthur Redford's three-volume *History of Local Government in Manchester*.

War found Manchester able to produce aircraft (including "Manchester" and "Lancaster" four-engined bombers), radar equipment, guns, tanks, radio, penicillin, sub-oceanic oil pipeline, Bailey movable bridges, parts of the "Mulberry" invasion harbours, the insecticide DDT and parts of the atomic bomb apparatus.

In air raids 600 persons were killed and 40,000 dwellings damaged; the internationally famous Free Trade hall, the assize courts, and the ancient inns and buildings adjoining the market place and known as the Old Shambles were destroyed.

Initiating Manchester's policy of a planned community, the corporation's aim in 1946 was to build 25,000 houses in the succeeding five years. Of these houses, 7,500 would complete the satellite town, Wythenshawe, which would then have cost £54,128,000; initial development for 4,000 of them had been completed in 1946. Complementary plans provided for the construction of schools, shops and other facilities. This five-year plan also included the clearance of many of the 68,000 unfit houses in the congested part of the city: the cleared areas were to be redeveloped as new open standards to a master plan, and a second satellite town was proposed at Mobberley, 12 mi. from the city. Parallel to this immense housing program, the council was considering a major highway program to cost £2,800,000. In the replanning of the bombed areas, a site was reserved near the city centre for a combined court of law estimated to cost nearly £2,000,000. (Hu. L.)

Manchuria

"Manchuria" is a term used in western languages and Japanese, but without equivalent in either the Chinese or Manchu languages, to designate the territory traditionally called in Chinese the Three Eastern Provinces of Liaoning (formerly Fengtien), Kirin, and Heilungkiang, to which a fourth province, Jehol, was at times administratively attached. It is bounded on the N. by Siberia; on the E. by Siberia and Korea; on the S. by the Gulf of Peichihli and the Great Wall of China; on the W. by Chinese provinces and the Mongolian People's republic. Area, 503,143 sq.mi. (including approx. 100,000 sq.mi. in Jehol); pop. (Japanese figures of 1940), 43,233,954 (incl. Jehol). Minorities: 1,162,000 Koreans; 1,035,525 Mongols (among whom there continued to be a strong nationalist movement); 642,300 Japanese (largely repatriated to Japan in 1946); and a few thousand Manchus, long since culturally assimilated to the Chinese. The Chinese population contains (1) an element anciently established in South Manchuria and (2) immigrants, during the 20th century, from Shantung, Hopei and Honan. Largest cities, according to Japanese figures of 1940: Liaoning (Mukden), 1,135,801; Pinkiang (Harbin) 661,984; Changchun (called Hsinking by the Japanese), 544,202; Antung, 315,242. Capital: until

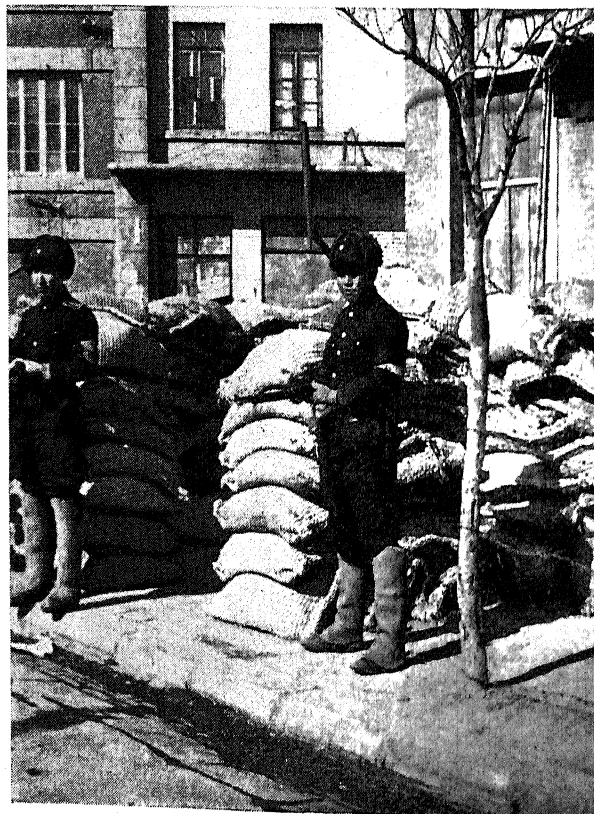
1931 Liaoning (Mukden); after 1932, Changchun. In religion, the majority of Chinese are conventionally listed as Buddhist and Taoist; but the ecclesiastical organization of both religions is weak, and the profession of faith of most laymen merely nominal. Lama Buddhism prevails among the Mongols. Moslems and Christians are small but important minorities, with Roman Catholics estimated at 130,000 and other Christians at 125,000.

The region as a whole was anciently inhabited by Chinese in the south, Mongols in the west, Koreans in the east and Tungusic tribes, from which the Manchus emerged as a political coalition in the 16th century, in the centre and north. From the Manchu conquest of China in 1644 until not long before the fall of the Manchu dynasty in 1911, the whole region (except for the Mongol areas) was treated as the private domain of the Manchu ruling house. It was then divided into provinces on the regular Chinese model. In the civil war and warlord period in China after 1911 these provinces were virtually autonomous, until the authority of the national government at Nanking was fully and voluntarily accepted in 1929.

In 1931 Japan invaded the territory. From 1932 to 1946, the Three Eastern Provinces (to which Jehol was annexed by a further conquest in 1933) were controlled by Japan through a nominally independent state which in 1934 was declared to be the "Empire of Manchukuo," under Pu Yi, heir of the Manchu line of emperors, who as a child had been deposed from the throne of China in 1911. Real control was in the hands of the commander in chief of the Japanese occupation forces, who was concurrently ambassador. Japanese held administrative posts in the government and entered all civil organizations.

In 1945, the U.S.S.R. entered the Pacific war, took prisoner Japanese troops estimated to number from 500,000

Armed Chinese guarding a police station barricaded with sandbags in Mukden, Manchuria, during March 1946. Tension between communists and nationalists was at a peak due to the delayed evacuation of Red army troops





Smoke, rising from a target in the city of Anshan, is visible through the nose of this B-29 Superfortress during a daylight raid on the "Pittsburgh of Manchuria" July 29, 1944

to 1,000,000 men, and captured Pu Yi. In accordance with the Cairo declaration of the United States, Great Britain and China, confirmed at Yalta by the United States, Great Britain and the U.S.S.R., and in 1945 by treaty between China and U.S.S.R., Manchuria then reverted to Chinese sovereignty.

Under Japanese control "Manchukuo" functioned as a pivotal position of the Japanese empire. Internal indoctrination and external propaganda were strongly anti-soviet, but in practice "Manchukuo" was used primarily to facilitate further encroachment in China, where countries like the United States and Britain had great interests. To an appreciable extent Japan succeeded, by advertising an anti-soviet policy in "Manchukuo," in weakening Anglo-U.S. resistance to the undermining of their own interests in China, although the U.S., under the Hoover-Stimson doctrine of nonrecognition of the fruits of aggression, which was endorsed by Britain, never officially recognized "Manchukuo." Japan retorted with measures restricting trade and investment, evading responsibility by asserting that these measures were enacted by the "independent" government of "Manchukuo." Relations with the U.S.S.R. were stormy. Soviet half-interest in the Chinese Eastern railway (the Chinese half-interest having been seized by the Japanese), was sold to the "Manchukuo" government, through negotiation with Japan, in 1935, on terms disadvantageous to the Russians.

There was chronic friction along the soviet frontier. In 1939, on the eve of war in Europe, soviet and Mongol forces inflicted a defeat on the Japanese at Nomonhan (Khalkha River), with losses greater than any ever previously admitted by the Japanese in any battle. The strength shown in this battle may have saved Russia from a double German-Japanese invasion. On the other hand, continuing Japanese hostility was shown by Japan's adherence to a

tripartite pact with Germany and Italy in 1940; but the seesaw dipped again when Japan signed a neutrality pact with U.S.S.R. in April 1941, and thus evaded joining Germany in the attack on Russia in June of that year. Under this pact the Russians undertook to respect "the territorial integrity and inviolability of Manchukuo," and Japan gave a similar pledge with regard to the Mongolian People's republic.

Soviet entry into the Pacific war was heralded by the denunciation of this pact in April 1945, on the ground that "Germany attacked the U.S.S.R., while Japan—Germany's ally—is helping the latter in her war against the U.S.S.R. Moreover, Japan is at war with the United States and Great Britain, who are the Soviet Union's Allies." Denunciation was followed, in August, by soviet (and Mongol) invasion of Manchuria, about two weeks before Japan's surrender to the United Nations. On Aug. 14, China and the U.S.S.R. signed a treaty, with several annexed agreements, which (1) restored full Chinese sovereignty and authority in the Manchurian provinces; (2) established joint Chinese-soviet ownership of the Chinese Eastern and South Manchuria railways (but not of other rail lines), for 30 years, after which the property was to revert to China without cost; (3) established a joint Chinese-soviet naval base at Port Arthur, also for 30 years, with ultimate reversion of all installations to China, without cost; and (4) established a free port at Dairen, under Chinese administration but with a soviet port manager,

Manchuria: Statistical Data, 1938

Item	Value (000's omitted)	Amount or Number
Exchange rate		
United States		1 Manchurian Yuan=28.45 cents (ls.2d.)
Great Britain		
Finance		
Govt. revenues*	\$253,800 (£51,912)	
Govt. expenditures*	\$253,140 (£51,777)	
Transportation		
Railroads		5,990 mi.
Highways		3,940 mi.
Airways		5,133 mi.
Communication		
Telephones		82,630
Telegraph lines		16,550 mi.
Radio sets		127,417
Crops		
Kaoliang		5,116,877 tons
Soybeans		4,509,509 "
Millet		3,877,891 "
Corn		2,729,295 "
Livestock		
Swine		5,335,700†
Sheep		1,966,000†
Cattle		1,683,300†
Goats		1,243,100†
Forest products		
Logs and cants		2,955,776 cu.ft.†
Sawn timber		1,410,260 cu.ft.†
Railway sleepers (ties)		123,252†
Exports—total	\$206,399 (£42,217)	...
Soybeans	\$66,650 (£13,633)	...
Bean cake	\$20,079 (£4,107)	...
Coal and briquettes	\$8,023 (£1,641)	...
Millet	\$5,764 (£1,179)	...
Imports—total	\$362,679 (£74,183)	...
Iron and steel	\$34,732 (£7,104)	...
Cotton cloth	\$21,567 (£4,411)	...
Machinery	\$19,585 (£4,006)	...
Rayon cloth	\$16,165 (£3,306)	...
Defense		
Standing army personnel		75,000
Military expenditures	\$31,837 (£6,512)	
Education		
Elementary schools		16,002
Students		1,422,386
Teachers		33,505
Secondary schools		137
Students		14,835
Teachers		1,959
Colleges		7
Students		1,765
Teachers		228

*Budget estimate.

†1937.

‡Exports only.

appointed from the soviet staff of the jointly owned railway, this arrangement also to terminate in 30 years.

At the Moscow conference of Dec. 1945, it was announced that soviet troops would withdraw from Manchuria by Feb. 1, 1946, but this date was deferred on the request of the Chinese government. From the surrender of Japan to the end of 1946 there was a period first of confusion and then of uncertainty, with the U.S.S.R. accused of allowing Chinese Communists to enter Manchuria and acquire surrendered Japanese arms, and with the United States accused of intervention in Chinese domestic politics by transporting government troops to Manchuria. After sporadic fighting, sometimes intense, a strong government wedge was established in the broad plain in the heart of Manchuria, with considerable Communist strength in the north and west, and an undefined but strong "state's rights" movement among Manchurian Chinese throughout the territory. It seemed likely that local political ascendancy would depend on whether this local movement entered into coalition with the government (Kuomintang) or the communists.

During the soviet occupation there was extensive stripping of Manchurian industrial equipment, which was removed to Siberia. This, and undisciplined behaviour of soviet troops, stimulated anti-Russian feeling, traditionally strong in Manchuria, which apparently was somewhat offset, later, by resentment against the United States for extending the scope of civil war by bringing government troops to a territory which otherwise would have been able to make its own terms with the communists and with the government. (O. Le.)

Mandated Pacific Islands

See PACIFIC ISLANDS, MANDATED.

Mandates

By 1937 the mandatory system was working regularly. The annual examination of a report from each mandated area, supplemented by the presence at the mandates commission of a representative of the mandatory power, was carried out in close detail. The Permanent Mandates commission's discussions were published almost verbatim, and it was upon these minutes that the efficacy of the League of Nations supervision of mandatory government depended. During the last years before World War II, the affairs of the B and C mandate areas, *i.e.*, the African and Pacific territories, called for no outstanding remark. The ordinary custom of the mandates commission was to examine the reports of the year before its twice-yearly meetings, although the representatives of the mandatory powers might later add up-to-date information. The history of the areas in 1937 was thus discussed in 1938; they were examined under a series of subjects, such as administration, finance, health, education, labour conditions and native development.

In 1938 and 1939 there was a considerable discussion with the Belgian, British and French representatives on the position of the chiefs and native authorities in the central African areas. The commission, which tended to support the principle of indirect rule, questioned the British officials closely on the alteration of administrative districts, and on the efforts in the Cameroons to organize native authorities where, in one region, they met the impact of the immigrant Africans from abroad. The commission noted in 1938 that the Belgian system in Ruanda-Urundi, which employed chiefs mainly as the agents of

government policy, was not indirect rule in the full sense, and hoped it would be possible to invest the chiefs with the authority required by their functions.

The main subjects of interest in those years, however, were the emancipation of Syria and Lebanon and the civil war in Palestine. The French government signed a treaty with its two mandated areas in 1936, providing for a period of three years during which the administration should be handed over to the peoples of the countries. By 1938, changes in French politics had caused a withdrawal from the policy of emancipation and the French representative reported that there was small chance of the ratification of the treaties. Nonetheless, the administration had begun to hand over to the Syrians and Lebanese. The Syrians, partly because of centralist dogma, and partly as a reaction from the policy of France in dividing the country during the mandate period, began direct rule of regions such as Latakia, the Djebel Druse and the Jezireh. Local resentment caused French intervention. The mandates commission showed anxiety regarding safeguards for minority rights, after the mandate should have expired, and also regarding the position of the French troops which it was proposed to station in certain places.

Palestine from 1936 onward had been in a state of fluctuating Arab war against the British, though by 1939 the conflict was flickering out. The mandates commission had considered the Peel report, with its suggestion of partition and failing that of restriction of Jewish immigration and land-purchase to be combined with planned development of the country. This had been followed by the Woodhead report, stating that partition was impracticable. In 1939 the British government published a White Paper stating that Palestine was to be given democracy and, after ten years, independence; that in the meantime Jewish land-purchase was to be forbidden in the hill-country and restricted in part of the plains, and Jewish immigration to be limited to 75,000, to bring the Jews to a third of the population. To explain this policy, Malcolm MacDonald, the colonial secretary, attended the commission for a special discussion in June 1939. Palestine did not present the relatively simple case of all the other mandates, where freedom of conscience, and, in the A and B areas, the "open door" regime were the only provisions not directly concerned with native welfare and development.

In Palestine, the general covenant obligation to govern the country as a trust for indigenous inhabitants, and the special recognition of the independence of the Arab areas, came into conflict with the mandate provision for the establishment of a national home for the Jews. Faced with this conflict, which ran through the whole history of the mandate, some of the members of the commission had abandoned the attempt to preserve impartiality. Through a long discussion in 1939, MacDonald advocated the new policy on the ground that the Arabs of Palestine, like any other people who came under the mandatory system, were protected by Article 22 of the covenant. The British government, the mandates commission and the League council had long agreed that the obligations to the Arabs and the Jews were of equal weight. The national home for the Jews was now firmly established; it had already impaired the rights of the Arabs, though not to extinction. The time had come to carry out the covenant and mandate obligations to the Arabs. Under these treaties not only were they promised independence, but it was specifically provided that the national home must not prejudice their rights and interests and that Jewish settlement on the land must not injure their rights and position. The British minister received severe criticism from

some members of the commission. In its report to the council the commission said that the interpretation of the mandate differed from that which had been accepted in former years, but it could not decide whether the new policy was or was not in accord with the mandate; four of its members thought that it was incompatible with the mandate; three did not. This refusal to find on the constitutional point was later much misquoted in propaganda about Palestine.

Mandates and the War.—By 1939 the commission was already shrunk in numbers. Neither the Spanish nor the Japanese member was allowed to attend in that year. The commission met for its 37th session in Dec. 1939. It asked the mandatories to say how their areas were affected by the war, and whether they were involved as belligerents. But the answer to that question was never to be given, for in 1940 Germany overran western Europe and isolated Switzerland. The meeting of Dec. 1939 was in fact the final session of the mandates commission. The international status of the mandated areas was unaffected by World War II. Indeed the Atlantic charter, with its repudiation of annexationist aims, confirmed that status by implication. But the areas were inevitably involved in the war. Palestine became an army base. Syria and Lebanon, after it became clear that the Vichy government would allow axis forces to use its aerodromes, were invaded by British and Fighting French troops in 1941, under a promise of their independence after the war. Thereafter they suffered a troubled course of emancipation.

The French provisional government confirmed their independence in 1943, subject to French control of the local forces and the continuance of French troops on their soil. This the Lebanese and Syrians would not accept, and at the end of the war they had broken off relations with France. They became original members of the United Nations at the San Francisco conference of 1945, and at the first session of the security council in 1946 they appealed for a decision that the French and British troops still stationed in their countries should depart. Both France and Britain accepted the appeal, and the case ended with an agreement that the four states should arrange the evacuation among themselves.

The French mandated areas in Africa followed the lead of Governor Félix Eboué of French Equatorial Africa, and declared for the Free French. They formed part of the lines of communication of the Allies for the rest of the war, as did the British areas. The mandated Pacific islands suffered terribly in the war. Japan invaded and occupied the whole of the New Guinea group and Nauru. The islanders were subjected to ruthless oppression by the Japanese troops and many of them to equally ruthless air bombardment by the U.S. navy in the course of their recapture. The Australian campaign in New Guinea, helped by the native people, was one of the hardest-fought of the war.

Trans-Jordan was granted independence in 1946, and constituted as an independent Arab kingdom. Palestine ended the war in a condition still more critical than that of 1939: The Arabs had, in practice, accepted the 1939 policy; but the Jews resisted it. They embarked upon a policy of aiding illegal immigration. In 1942 the Jewish agency for the first time declared a policy of a Jewish state and army. Jewish nationalism was strengthened by the massacres in Europe, and Arab nationalism was confirmed by the organization of the Arab league. After the war, the Jews waged war upon the British both by assassination and by organized military action. British

attempts to obtain an agreed solution by impartial inquiry, by enlisting the help of the United States and by trying to hold a round-table conference were frustrated in 1946.

Trusteeship.—The future of the colonial peoples was discussed in official and unofficial circles among the Allies during World War II. The result was a consensus of opinion that the mandatory system, with some modifications, should be applied to the former mandated areas and to any colonial possessions conquered from Germany, Italy and Japan. The conference of San Francisco considered drafts prepared by Australia, Britain, China, France, the U.S.S.R. and the U.S. These showed signs of previous consultation, but varied somewhat, the Chinese proposals being the most detailed. After considerable discussion, two chapters on colonial government were included in the United Nations charter.

Chapter XI of the charter, the declaration regarding non-self-governing territories, embodied the Australian proposal. Under it, the United Nations recognized that the interests of the inhabitants of the colonial lands were paramount and undertook to ensure their welfare and to develop self-government. They also promised to send the United Nations information on the progress of these policies; an undertaking which Britain began to fulfill in 1946. This chapter amounted to a general pledge of enlightened policy; it did not put colonies under international control in any way. The trusteeship system was founded by chapter XII. This provided for the administration and supervision of territories defined as former mandated areas, colonies detached from the axis powers and any others which might voluntarily be added by their rulers.

The aim of the system was "political, economic, social and educational advancement of the inhabitants of the trust territories, and their progressive development toward self-government or independence as may be appropriate," respect for human rights and economic equality for all members of the United Nations. There was to be a separate trust agreement for each territory. For territories defined as "strategic areas" account was to be made to the security council, which might, however, ask the trusteeship council to supervise the provisions for welfare and development. Annual reports from the trustee would be examined by the trusteeship council, which might also receive petitions and visit the areas; it was to report to the assembly. The trusteeship council was composed of representatives of the trustee states, of nontrustee permanent members of the security council and of enough states elected by the assembly to make the number of nontrustee members equal to the trustees.

There was some difficulty in getting the system going, owing to opposition by the U.S.S.R. during the first assembly of 1946; this, however, was abandoned in the second part of the assembly held in October. At that session the trusteeship council was constituted. It consisted of Australia, Belgium, Britain, France and New Zealand, trustees respectively for New Guinea and Nauru, Ruanda-Urundi, Tanganyika and British Togoland and Cameroons, French Togo and Cameroons, and Western Samoa; and of China, the U.S.S.R. and the United States, non-trustee permanent council members, and Iraq and Mexico, elected by the assembly.

South Africa stated at the 1946 assembly that it proposed to annex its mandated area of South-West Africa. In reply to criticism, based upon the absence of self-

Mandated Areas in 1937					
Territory	Area Sq. Mi.	Date of Mandate	Class	Former Ruler	Mandatory Power
Palestine	10,100	Sept. 29, 1923	A	Turkey	Great Britain
Trans-Jordan	34,740		A	Turkey	Great Britain
Syria and Lebanon	77,062		A	Turkey	France
Tanganyika	360,000	July 20, 1922	B	Germany	Great Britain
Ruanda-Urundi	21,200		B	Germany	Belgium
French Cameroons	166,200	July 20, 1922	B	Germany	France
British Cameroons	34,081		B	Germany	Great Britain
French Togo	20,000	July 20, 1922	B	Germany	France
British Togoland	15,040		B	Germany	Great Britain
South-West Africa	323,060	Dec. 17, 1920	C	Germany	Union of South Africa
New Guinea	93,000	Dec. 17, 1920	C	Germany	Australia
Nauru	8	Dec. 17, 1920	C	Germany	Australia, on behalf of Australia, Britain and New Zealand
Western Samoa	1,153	Dec. 17, 1920	C	Germany	New Zealand
Pacific Islands under Japanese mandate	811	Dec. 17, 1920	C	Germany	Japan

Trans-Jordan became an independent Arab kingdom in 1946.

Syria and Lebanon were recognized by Great Britain and the Fighting French as independent republics in September and November 1941 and later by all the great powers.

government of the African inhabitants, South Africa conducted an inquiry and reported that the inhabitants both white and African desired union with South Africa. The assembly meeting of October refused this proposal by a large majority; whereupon South Africa declared that it would not accept the assembly ruling. During this period also the United States proposed to the security council that they should rule the islands formerly under mandate to Japan as a security area under sole trusteeship. The security council approved this proposal by unanimous vote April 2, 1947.

The charter provisions on trusteeship went further than the covenant of the League of Nations in providing explicitly for eventual self-government or independence. In all other respects they were more vague than the covenant, with its specific obligations on subjects such as land-tenure and labour conditions. The drafting of the charter, indeed, was confused. The texts of the trustee agreements to some degree remedied this defect.

The main difference in regard to administration was that the mandates (except in the French B areas in case of a general war) forbade the conscription of natives and the use of the areas for naval, military or air bases; whereas in the trustee territories the trustees might make bases, in conformity with world agreement for security, and might raise volunteer forces. This represented a change in the view taken of the morality of training backward peoples in modern methods of war. The trusteeship council had a new power, compared with the mandates commission: it might visit the territories. It had, however, completely altered in the nature of its membership, for members were to be representatives of states, an innovation due to U.S. and Russian policy.

With such membership, it would clearly be difficult for the body to exercise what was, in effect, a quasi-judicial function demanding complete independence of judgment. The success of the mandatory system was due to the detachment from governmental control of its members, who were not allowed to be in the employment of any government. (See also PACIFIC ISLANDS, MANDATED.)

(F. WHI.)

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Manganese

Wartime gaps in statistics for manganese production had been largely filled by the end of the decade 1937-46, but there were still insufficient data to permit an estimate of the world totals in 1943, 1944 or 1945. However, reported outputs in 1945 were very close to the totals from the same countries in 1943.

Even for the years in which world totals could be made, it was difficult to draw conclusions of much significance, beyond the fact that not only during World War II, but previously as well, world production was well in excess of consumption, and the surplus was being stocked for future emergency needs.

Manganese production in the United States during World War II was a repetition of the experience of World War I. Output was materially increased above the peacetime level but reached only a small fraction of the demand, as shown in Table II.

Throughout the world the shifts in production as shown in Table I could be correlated quite closely with the distance of the source from the centres of consumption and the resulting difficulty in maintaining adequate shipping capacity over the long distances involved. Cuba and Brazil, as the sources closest to the United States, showed the

Table I.—World Production of Manganese Ore (Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Brazil	289,256	337,334	284,123	345,454	482,153	337,573	303,744	162,021	269,679
Chile	14,345	21,296	13,834	12,809	39,479	78,586	125,745	79,884	...
Cuba	144,732	136,514	112,893	132,114	277,104	274,756	343,054	284,246	218,261
Egypt	205,382	168,777	132,147	71,553	2,398	9,005	7,803	33	52
Gold Coast	590,281	450,241	427,841	488,321	549,922	761,714	589,033	564,993	?
India	1,177,787	1,084,082	946,024	973,190	880,255	848,143	666,790	?	?
Italy	36,963	53,222	49,589	56,202	65,888	?	?	?	16,963
Morocco, French	84,283	95,457	83,102	115,426	55,911	48,803	54,007	30,369	49,600
Philippines	28,129	64,092	32,401	57,503	56,000	?	?	?	?
South Africa	695,771	608,187	462,636	454,230	491,512	434,801	241,540	117,818	105,000
U.S.S.R.	3,033,500	2,505,000	?	3,086,000	2,638,000	2,010,000	?	508,000	2,480,000
United States	45,070	28,359	32,823	44,938	87,795	190,747	205,172	247,614	182,335
Total	6,684,000	5,832,000	5,704,000	6,103,000	5,800,000	5,300,000	?	?	?

Table II.—Data on the Manganese Industry in the United States (Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Mine shipments	45,070	28,359	32,824	44,936	87,794	190,748	205,173	247,616	182,337
Metallurgical ore	29,589	19,027	20,810	30,416	73,852	177,966	195,096	241,170	174,295
Battery ore	7,221	5,554	8,699	10,383	11,399	12,377	9,973	6,224	8,042
Ore imports	1,021,349	541,616	702,384	1,435,928	1,714,581	1,583,024	1,511,630	1,315,677	1,311,346
Brazil	87,347	33,262	47,839	188,430	353,850	326,469	373,396	197,399	242,275
Cuba	137,689	147,193	118,648	146,324	272,614	156,256	211,780	467,059	293,572
Gold Coast	285,093	142,080	272,074	276,621	222,776	189,236	216,773	159,982	208,700
India	78,826	28,538	100,290	212,210	433,337	600,759	462,941	346,824	210,493
Philippines	—	4,482	7,802	48,737	63,894	—	—	—	—
South Africa	122	—	3,809	199,068	306,599	234,195	127,660	41,358	61,981
U.S.S.R.	430,023	185,967	151,472	349,158	32,685	17,769	4,553	—	151,345
Consumption	?	?	?	?	1,310,458	1,481,672	1,588,323	1,593,098	1,485,859
Ferromanganese made	421,616	272,153	302,524	514,682	580,704	661,338	702,484	702,632	619,760
Spiegeleisen made	?	12,688	102,470	114,119	177,915	186,026	149,036	165,530	139,039

heaviest increases, with Cuba favoured, not only because of the shorter supply route, but also because the worst of the submarine menace was avoided. Chile, more remote, still shared in the supply. Already handicapped by distance, India suffered still more when the Mediterranean was closed to traffic and shipments had to go around the southern point of Africa. With the Mediterranean closed Egypt practically dropped out of the picture, and water shipments were stopped from the soviet deposits. The Gold Coast continued to ship to Great Britain, but U.S. imports were not allowed to increase. The South African output was cut heavily by the loss of prewar shipments to Germany, some of which were replaced by exports to the United States. Many of these points are brought out even more strongly by the breakdown of U.S. imports by country of origin in Table II.

Prewar estimates of possible needs for manganese ore in the United States in the event of war were of the order of 1,000,000 long tons, or 1,120,000 short tons, but experience showed that this figure was too low by 30%. U.S. production reached its peak in 1944, when production was less than one-sixth of consumption. Actually the record was not even so good as it appeared from these figures, since an unknown but considerable proportion of the domestic output was below the grade demanded by industry and was not used. For the most part, the country was dependent on imports and remained so throughout World War II. By 1936 the consuming industry decided that the trend of world affairs indicated the probability of future needs for manganese ore on a scale larger than ever before, and imports were stepped up sharply, the surplus over current consumption going into stocks. In 1936 and 1937 imports were respectively 15% and 39% greater than in 1926, the former record year, and by 1941, the peak war year, imports were 116% greater than in 1926. Even after the peak of war imports had been passed, with successive declines in 1942-45 inclusive, the 1945 imports were 65% greater than in 1926.

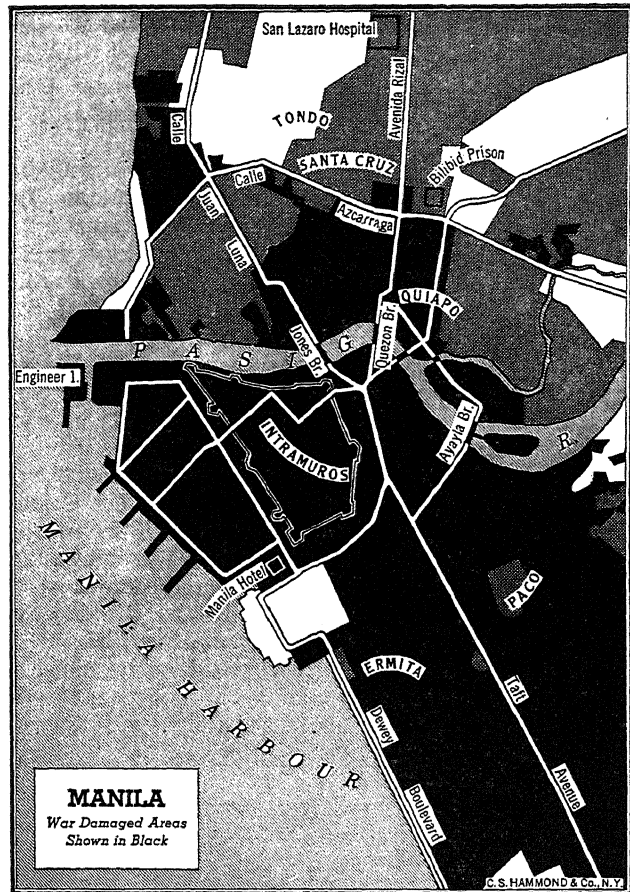
U.S. production and consumption declined in 1946, but imports increased moderately. The figures covering the first three-quarters of 1946 were 107,700 tons for production, 810,161 tons for consumption and 1,187,835 tons for imports.

Adequate imports were maintained throughout the war period, not only for current consumption, but also to build up emergency stocks. The full extent of these stocks had not been reported, but at the end of 1945, after some ore had been declared surplus and turned over to the national stockpile, the Metals Reserve stocks still amounted to 1,119,158 tons, and producers and consumers held 513,063 tons. By Sept. 30, 1946, these stocks had risen to a total of 1,786,184 tons, an increase of only 153,963 tons, while production plus imports in the same time showed a surplus of 475,374 tons above consumption.

(G. A. Ro.)

Manila

Upon the inauguration of the commonwealth of the Philippines on Nov. 15, 1935, President Manuel Quezon decided that Manila was too crowded and busy as an industrial and commercial centre to serve properly as the capital city of the future republic. He therefore started to plan a new capital that would rise to the northeast of Manila about ten mi. away. All the important government buildings would be located there, including the capitol, the executive mansion, the supreme court and the state-owned University of the Philippines. Accordingly, many millions of pesos were appropriated in subsequent



years to purchase the necessary sites, to lay out and construct broad avenues and to finance the purchase and resale of lots to prospective home builders, as well as the construction of private homes and the necessary community utilities, like public schools and markets, in designated zones.

When Japan invaded the Philippines on Dec. 8, 1941 (Manila time), the construction of the new capital city was fairly well advanced. The main avenues had been built, the first four units of the state university were under construction and the foundation piles for the capitol had been sunk. The city, named after Quezon, had its own separate government.

The day before President Quezon and his cabinet sought refuge in Corregidor on Dec. 23, 1941, however, Quezon City was incorporated into the city of greater Manila, together with four other suburban towns, Caloocan, San Francisco del Monte, San Juan del Monte and Pasay. This step was taken ostensibly to insure better protection for the inhabitants of Manila proper and its environs.

The 1939 census had placed the population of Manila proper at 623,492. After the incorporation of the near-by towns, and as a result of the influx of thousands of families from the provinces into the city, the population of Manila was estimated at more than 1,000,000.

Manila was declared an open city by the U.S. military authorities within two weeks after the outbreak of the war. Except for the Japanese bombing of the shipping on the harbour and in the Pasig river and of the northern strip of the walled city (Intramuros), the city was relatively undamaged. When, on Jan. 2, 1942, two prongs of the Japanese invading columns entered the city from the north and south, they found the Port Area and the military barracks and installations, the warehouses and gasoline dumps on fire. Otherwise the city remained whole.

And so it remained throughout the Japanese occupation, except for two minor retaliatory raids by the U.S. air force before the fall of the Philippines, aimed at the Japanese military installations.

During the liberation of the Philippines starting in Oct. 1944 and ending with the recapture of Manila in Feb. 1945, the city suffered considerable destruction. The city was sacked and burned and blasted by the Japanese garrison troops that had been left behind with orders to massacre the inhabitants, destroy the areas they were defending and fight to the last instead of surrendering.

Taken by surprise, the Japanese troops, which had not expected the U.S. penetration from the north so soon, were driven toward the southern part of the city beyond the river. Some Japanese troops, however, were able to hold out in the concrete buildings in the commercial district along the northern bank of the river. There they were cornered, fighting to the bitter end, and in accordance with their orders, finally destroying the buildings.

South of the Pasig, the Japanese proceeded with their premeditated program of wholesale massacre and destruction. Infiltrating U.S. troops and Filipino guerrillas saved some of the outlying areas, and several thousand refugees were enabled to cross over to the U.S. lines. But the city's residential districts of Ermita, Malate, Paco, Santa Ana and Pandacan were almost completely devastated. Intramuros, the historic walled city with its numerous churches built during the three centuries of Spanish rule, easily the most picturesque spot in all Manila, was completely levelled to the ground when, upon the refusal of the Japanese troops to surrender, the U.S. troops decided to demolish the whole enclosed area with artillery fire.

It was subsequently estimated that 70% of the entire city was destroyed during the period of the liberation. This included the entire commercial district, the Port Area with its piers and harbour installations, the poorer districts of San Nicolas and Tondo north of the river, and in the south, the national and city government buildings, the state university plant and the better residential areas.

In two years following the liberation, very little new construction was done because of the shortage of necessary materials. The Philippine government was working on an ambitious plan to lay out the city anew, with fewer and wider avenues to take the place of the numerous small, winding streets dating from three centuries before, when all of Manila outside the walled city was a mere sprawling suburb. A City Planning office had been set up to make a blueprint for the new Manila, to rise out of the ruins. This blueprint involved abandonment of the earlier plan to move the national government out of the city proper, and the construction of the new government buildings in accordance with the new zoning plan.

A plan of this nature, involving the expropriation of a considerable area of privately-owned land, required the expenditure of many millions of pesos. In view of the fact that the Philippine government was without adequate funds to carry out even the most essential functions and services, it was doubtful whether the reconstruction of the city of Manila in accordance with the ambitious plans could be undertaken within five years.

In the meantime, the people of Manila had to repair such damaged structures as could be safely used for commercial and other purposes and to rebuild homes out of the burned-out rubble and such other materials as were available. It was inevitable that these temporary repairs and reconstructions should follow the old street plans—

a situation which might render even more difficult the enforcement of the new zoning and building regulations when permanent construction began.

The Escolta and Rizal avenue—the two major commercial streets—once more hummed with business and trade at the end of 1946. Temporary wharves—wholly inadequate for the purpose of unloading the ships calling at the harbour—had partially replaced the world-famous pier 7 and the other piers of prewar days. But the historic walled city of Intramuros—founded in the 16th century by the Spanish conquistador Miguel López de Legazpi—was definitely gone. The space it formerly covered was to be converted into an extension of the Port Area, and the mediaeval quiet and religious atmosphere of centuries was to be replaced by the clangor of gigantic cranes and locomotives. (C. P. R.)

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Manitoba

Manitoba, central province of Canada and geographic centre of North America, lies within the Hudson bay watershed and is drained through the Nelson and Churchill river systems; it was established in 1870. The area is 246,512 sq. mi. (26,789 sq. mi. water); capital, Winnipeg, incorporated in 1873 (221,960). Other cities: St. Boniface (18,157), centre of culture for Canadians of French origin, west of Quebec; Brandon (17,383); Portage la Prairie (7,187). In 1946, there were 30 incorporated towns, 24 villages, 1 municipal district (Flin Flon in the northern mining area) and 115 rural municipalities. Population (1941 census) 729,744. In 1941, 44% of the population was urban; Canadian-born, 73%; density, 3.32 per sq. mi.; 67% of Protestant religion, 28% Catholic religion.

Lieutenant-governors during the decade were William J. Tupper, 1934–40 and R. F. McWilliams, who succeeded him in 1940. Premiers were John Bracken, Aug. 8, 1922–Jan. 14, 1943, and Stuart Sinclair Garson after that date. The unicameral legislature (elected Oct. 15, 1945) was the 21st and consisted of 58 members, one each representing the navy, army and air force for that assembly only.

During the decade 1937–46, the province of Manitoba continuously led the case for a readjustment of fiscal and jurisdictional relationships in the Canadian federation. It recommended changes that would align financial resources with constitutional responsibilities, in contrast with the outlook of the days when the constitution was created in 1867, and the subsequent growth of pools of wealth in certain industrial areas in Canada, not taxable by the regions in which this wealth originated. Its presentation resulted in the creation of the Royal Commission on Dominion-Provincial Relations. Subsequent dominion-provincial conferences were unsuccessful in reaching agreement on recommendations, and later proposals of the Canadian government in respect to fiscal and social security programs likewise were not unanimously acceptable by the provinces. In 1946, however, agreement was reached on a minimum basis between Manitoba and the Canadian government and certain other provinces whereby the Canadian government agreed to pay certain sums in lieu of provincial income and succession duty taxation.

Early in the period, tentative advances were made by the government of John Bracken to establish a nonpartisan government, to develop a less rigid party aspect to the business of government, to provide a united party front on behalf of Manitoba's case for fiscal and constitutional ad-

justments in the Canadian confederation, and (when coalition was accomplished in 1940) to establish a union of political forces to enhance Manitoba's participation in the war effort. A coalition government was established in Oct. 1940 with representation in the cabinet from the Liberal-Progressives, Conservatives, Co-operative Commonwealth Federation and Social Creditors. The Co-operative Commonwealth Federation withdrew and formed the official opposition when John Bracken left the Manitoba government in 1943 to take the leadership of the National Progressive-Conservative party.

Local government passed through transition from a financial crisis caused by depression relief costs of the preceding years and consequent reduced tax payments, to a position of budgets operating on a cash basis with reserves. In 1946 plans of a regional method of assessment and equalization were presented to municipal officers, the purposes of which were to create a new assessment with equalization spread over greater areas and with resulting co-ordination and efficiency.

The economic record of the decade, generally, was one of rising prices for increasing production and the expansion of trade following a period of drought, depression and agricultural surpluses. The year 1937 marked the turning point in Manitoba and the agricultural economy of the Canadian plains and prairies. The experiences of the previous years had emphasized the need for diversification within the agricultural industry and an increased diversification within the total productive life of the province. A sugar beet industry within the Red River valley was started in 1940 with government guarantees which were not required. After experimentation, a pilot plant for processing flax was created at Portage la Prairie in 1945. A co-operative vegetable oil plant, processing sunflower, soybean and rape seeds, was established at Altona also in 1945. In 1937 a muskrat development scheme for northern Manitoba was started, which by 1946 was well established with additional areas in the central part of

the province, and in 1944 this was supplemented by a trap-line control system for wild fur conservation and balanced production. Fish catches doubled with quadrupled values in the ten-year period. A second reaction from the depression years was the recognition of the need to understand more completely the economic and social life in Manitoba. Consequently, under government guidance and support, there was an intensive self-analysis during the decade by those qualified within the province, assisted by professional assistance from without.

The ten-year period was distinguished by this research, which began with the preparation and presentation of briefs to the Royal Commission on Dominion-Provincial Relations and benefited by the guidance of A. R. Upgren, Jacob Viner and Alvin Hansen of the United States. Subsequently there was established an Economic Survey board, under C. B. Davidson and Dr. H. C. Grant, which supervised the preparation of 24 reports in 1938 and 1939 dealing with every phase of the natural resources, climate, soils, employment and unemployment, education and finance. A Western Farm Marketing conference was held in 1938 which dealt with agricultural policies and price levels. Later, a joint study by the staff of the University of Manitoba and University of Minnesota was conducted on the similarities of economic developments in both areas. The crisis of the city of Winnipeg arising out of the relief problems of the depression, and the basic structures of government utilities, was studied and reported upon by commissions headed by Dr. H. Carl Goldenberg of Montreal. A special committee reported upon the establishment in Manitoba of a land court; another upon crop insurance. In 1941 public health in Manitoba and in Winnipeg was studied by the American Public Health association, and from this report a health and welfare program was adopted within both jurisdictions.

In the provincial sphere, a complete health plan was

Manitoba: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange Rate						
Great Britain		4,867 Canadian \$ = £1		4,45 Canadian \$ = £1		4,45 Canadian \$ = £1
United States		1 Canadian \$ = 99.4 cents		1 Canadian \$ = 90.9 cents		1 Canadian \$ = 90.9 cents
Finance						
Provincial revenues	£3,863 (\$18,884)		£5,038 (\$20,313)		£4,803* (\$19,380)	
Provincial expenditures . .	£3,760 (\$18,382)		£4,463 (\$17,996)		£3,283* (\$13,246)	
Transportation						
Railroads		4,860 mi.		4,854 mi.		4,837 mi.
Highways		91,103 "		92,622 " †		91,365 " †
Communication						
Telephones		71,122		83,234		95,738
Telegraph lines				94,357		4,163 mi. †
Radio sets		73,099				106,144 †
Minerals						
Copper		32,791 tons		33,509 tons		21,939 tons
Gold		185,706 oz.		150,553 oz.		74,168 oz.
Zinc		23,432 tons		§		22,911 tons
Cement		330,889 bbl.		572,408 bbl. ||		865,756 bbl.
Sand and gravel		1,216,084 tons		1,851,645 tons ||		1,102,448 tons
Crops						
Wheat		1,500,000 tons		1,635,000 tons		1,200,000 tons
Hay and clover		767,000 "		1,320,000 "		754,000 "
Oats		656,000 "		816,000 "		872,000 "
Barley		434,000 "		1,032,000 "		1,260,000 "
Potatoes		107,000 "		183,000 "		84,000 "
Livestock						
Cattle		842,000		765,000		1,024,000 †
Horses		325,000		302,000		264,000 †
Sheep		231,000		246,000		288,000 †
Swine		219,000		503,000		457,000 †
Manufactures—total	£28,480† (\$140,805)	...	£29,075† (\$128,949)	...	£68,680‡ (\$277,125)	...
Slaughtering and meat						
packing	£5,907† (\$29,205)	...	£5,798† (\$25,713)	...	£21,643§ (\$87,331)	...
Railway rolling stock	£2,641† (\$13,059)	...	£2,630† (\$11,664)	...	£3,986§ (\$16,085)	...
Flour and feed mills	£2,236† (\$11,055)	...	£1,326† (\$5,882)	...	£4,254§ (\$17,163)	...
Butter and cheese	£2,006† (\$9,918)	...	£2,113† (\$9,372)	...	£4,120§ (\$16,625)	...
Education						
Enrolment						
Provincial schools		149,621		136,950		124,912
Private schools		8,825		6,291		7,647
Dominion Indian schools . .		2,567		2,158		2,168
Universities and Colleges .		5,363		5,258		4,404

*Provisional figures. †1942. ‡1945. §War restrictions precluded publishing of detailed data. ||1940. ¶1937. ¶1939. §1943.

established with creation of rural health units for the prevention of disease, diagnostic facilities for the medical profession, medical care for all citizens by payment of fees in advance, and hospitals provided for through the creation of hospital districts. In 1946, 11 health units were in operation, comprising 32 municipalities with a total population of 207,131. One hospital district was operating and six others were awaiting organization. In 1937 and subsequent years Dr. F. W. Jackson, deputy minister of health and welfare, recommended premarriage medical examination; on Oct. 1, 1946, this became law. In 1942 the adaptation of farm electrification within Manitoba was reported upon by a commission under the direction of Dr. Emerson Schmidt; from these recommendations a provincial-wide development was undertaken, with original plans for 5,000 farms a year. In 1945 and 1946, however, shortages of material and experienced manpower retarded the accomplishment of the annual program. Five areas in Manitoba were prepared for land settlement by the use of power machines, in contrast with the original slow and harsh pioneer methods, with veterans of World War II being given priority.

A special research project on labour-government-management relations was completed by W. F. Loughheed in 1943. In 1943 and 1944 a special committee of the legislative assembly, together with professional assistance, completely surveyed the administrative and curricular needs of the educational system and emphasized in its report the advantages of a larger unit of school administration, the need for equalization of school financial support, a special type of school able to provide alternative types of courses, and composite high schools with technical and agricultural courses, and a survey of adult education. In 1946 two regions recorded opinions upon the larger unit of administration, the Dauphin area deciding affirmatively. A Royal Commission on Adult Education surveyed the subject under the chairmanship of A. W. Trueman, with Harold A. Innes of Toronto, John Grierson, former head of the Canadian Film board, J. J. Deutsch, economist of the Canadian government and Frances MacKay, director of women's work in the Manitoba department of agriculture.

Plans for the transition in the postwar era were started early with the creation of the Postwar reconstruction committee comprising the deputy ministers of departments of government, advised by W. J. Waines, and assisted by numerous academic, professional, technical and business leaders of the province. The reports prepared by this organization, and all other postwar plans prepared in Manitoba, were later studied for purposes of co-ordination by a special group of representative citizens headed by W. J. Parker, president of the Manitoba Pool Elevators. All projects studied, including those already mentioned in this article, were given a priority based on need for employment and need of the communities of the province. Reports included: Manitoba Agriculture and Prairie Farm Rehabilitation; Industrial Utilization of Plant and Animal Products; South-Eastern Manitoba Land Classification, Land Use and Settlement; Town and Country Planning.

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(J. L. J.)

Mannerheim, Carl Gustav Emil von

Marshal Mannerheim (1867–), Finnish army officer, was born June 4, 1867, at Louhisaari, Finland. He studied at Russian military schools, at the Hamina Cadet school and at Nikolaev Cavalry school in St. Petersburg. During World War I Mannerheim served with the tsarist armies. At the outbreak of the revolution in 1917, he left his command and returned to Finland, then in the throes of civil war. Mannerheim was made commander in chief of the White army and, enlisting German aid, quelled Finnish and Russian communists. On Dec. 12, 1918, he became regent of Finland, holding this office until the establishment of the republic in June 1919, when he was defeated in the presidential elections and retired from public life.

Recalled in 1931 to head the Finnish council of defense, Mannerheim reorganized Finland's armies, planned the Mannerheim line of fortifications strung across the Karelian isthmus, and was made a field marshal in 1933. He led the Finnish troops in the winter war against soviet Russia in 1939-40, and continued as supreme commander of Finland's armies when his country joined Germany in the war against the soviets in June 1941. On Aug. 1, 1944, Mannerheim was made president with authority to negotiate an armistice with the U.S.S.R. Following several disputes with the soviet union, he resigned in March 1946.

Mannerheim Line

See WORLD WAR II.

Manpower, War

See WAR AND DEFENSE AGENCIES; WAR PRODUCTION.

Manufacturers, National Association of

See SOCIETIES AND ASSOCIATIONS.

Manuilsky, Dmitry Zacharovitch

Manuilsky (1883–), Ukrainian statesman, was the son of a village priest. He studied at Petrograd university and became active in the revolutionary movement. He was arrested for participating in the Kronstadt revolt, and was exiled from St. Petersburg in 1906, but escaped and fled to France. After the outbreak of the revolution in 1917, he returned to Russia, joining the Bolsheviks. After the death of Lenin, Manuilsky was named to membership in the central committee of the Communist party, and in 1924 he was a member of the comintern.

In 1944, Manuilsky was appointed foreign commissar for the Ukraine Soviet Socialist Republic and in 1945, he represented that state at the United Nations conference in San Francisco, and later at sessions of the U.N. assembly and security council.

At the 21-nations peace conference in Paris in 1946, Manuilsky announced his intention of filing with the U.N. security council charges that Greece was endangering the peace in the Balkans, adding that Britain was the "principal factor" in aggravating the situation.

At the peak of anti-soviet sentiment in the United States, Manuilsky charged Sept. 10, 1946, that the western nations were waging an "aggressive war of words" against the soviet union and likened the method used in the alleged attacks to the technique employed by Joseph Goebbels.

Mao Tse-tung

Mao (1893–), Chinese Communist leader, was born in the village of Shao Shan in Hsiang T'an county of Hunan province, son of impoverished peasants. After sev-

eral years of formal schooling in Changsha, he joined Sun Yat-sen's revolutionary army in 1911; later he resumed his studies and entered the Hunan Normal school, receiving his degree in 1918.

Mao was present in 1920 at the Shanghai conference at which the Chinese Communist party was formed and in 1922 he was secretary of the party's branch in Hunan province. He helped organize the peasant membership of the party and in 1927 he led the Communist uprising in the Chingkanshan area. The following year, Mao became political commissar for the Chinese Red 4th army and in Dec. 1931, he was elected chairman of the first All-China congress of soviets.

Soon after the outbreak of war with Japan in 1937, Mao's forces occupied a large part of northwest China despite Japanese infiltration. By 1942, however, Chungking's military forces blockaded the areas in which the Chinese Communist guerrillas operated. Chiang's demands in 1943 for dissolution of the Chinese Communist armies and political organizations were rejected by Mao.

After the surrender of Japan, Mao and Chiang began personal negotiations, in the late autumn of 1945. While they failed to agree on military and administrative unity, they emphasized in a joint communiqué issued Oct. 11, 1945, that civil strife must be avoided. However, civil war

between the two factions did break out and on June 24, 1946, Mao charged that U.S. aid to Chiang's government was the "fundamental cause of the outbreak and propagation of the civil war."

Maple Products

The "sugar orchard" industry had been declining steadily in the United States for three decades down to 1937 and descended to a new low in 1945, the most disastrous year since records had been kept by the government. The number of trees tapped was 17,053,000 in 1918, with an output of syrup and sugar (in terms of sugar) of 38,161,000 lb. By 1937 the number of trees had declined to 11,677,000 and the output to about 8,184,000 lb. of sugar.

There was a considerable loss of trees in New England from the hurricane of 1938. Trees were also being reduced in number by natural causes. The very poor crop of 1945 was the result of freakish weather and labour shortage. Sap started to run in February during an unusually warm spell. Producers were not prepared for early tapping and were handicapped by the deep snow. Warm March weather started the buds on the trees and brought the run of sap to an early and abrupt end. This later sap was "green," spoiled easily, had low sugar content and spoiled the quality of the syrup. The price of syrup ad-

Oxen hauling a tank used to collect sap from maple trees at Marlboro, N.H. New England farmers worked hard to meet increased demands for maple sugar and syrup during the war-created sugar shortage



vanced from \$1.61 per gal. in 1937 to a top of \$3.04 in 1944. At the same time the price of sugar rose from 28.9 cents per lb. to 47.4 cents.

Canadian production of maple sugar averaged about 28,000,000 lb. in the prewar period. About 24,000,000 trees were tapped each year in Canada, and one-fourth of the crop was exported to the United States. Imports in 1944 amounted to 3,883,000 lb. of sugar and 1,798,000 lb. of syrup. (J. C. Ms.)

U.S. Maple Sugar and Syrup Production, 1937-46
(In thousands of pounds of sugar, gallons of syrup)

	1937		1941		1943		1946	
	Sugar	Syrup	Sugar	Syrup	Sugar	Syrup	Sugar	Syrup
U.S. Total	1,047	2,508	387	1,997	578	2,255	372	1,328
Vermont	476	940	190	759	354	1,072	256	607
New York	291	643	99	604	124	839	67	411
Massachusetts	93	64	21	58	26	66	12	38
Pennsylvania	62	155	36	112	27	95	11	45
Maryland	12	36	4	13	8	15	5	10
New Hampshire	58	61	16	49	22	66	12	36
Maine	20	36	4	18	7	27	7	10
Michigan	16	99	12	96	6	134	2	63
Ohio	12	401	4	254	2	193	0	80
Wisconsin	7	73	1	34	2	48	0	28

BIBLIOGRAPHY.—For statistics of production and value, U.S. Bureau of the Census, *Statistical Abstract*.

Maps

See CARTOGRAPHY; GEOGRAPHY.

Marble

See STONE.

Margarine

The serious shortage of fats for human consumption, particularly butter, brought about a constant increase in the production of U.S. margarine during the decade 1937-46. The output had reached a total of 369,484,000 lb. in 1920, as reported by the bureau of internal revenue, and civilian consumption was estimated at 3.4 lb. per capita. This high rate of production was not reached again until 1935, when it suddenly increased to 381,631,000 lb., but the civilian consumption was only 3 lb. per capita. The shortage of vegetable oils, particularly cotton seed and foreign vegetable oils in 1938 and 1939 reduced production to 300,856,000 lb. in 1939. Quotas of raw materials were set in late 1942, and production of margarine for civilian use was limited to 590,000,000 lb. in 1943, 569,000,000 lb. in 1944 and 471,000,000 lb. in 1946. Not until 1946 did manufacturers utilize their full quotas. Civilian consumption was estimated at 4 lb. per capita in 1945 and a little less for 1946. The raw materials used in the manufacture of margarine in 1945 consisted principally of vegetable oils as follows: cottonseed oil, 253,997,000 lb.; soybean oil, 206,642,000 lb.; peanut oil, 10,215,000 lb.; and corn oil, 9,174,000 lb., or a total of 480,166,000 lb. of all U.S. vegetable oils. Before 1942 large amounts of imported vegetable oils were used (105,802,000 lb. in 1938) but these were no longer available after 1942. Consumption of animal fats ranged from about 20,000,000 lb. in 1937 to 37,691,000 lb. in 1942. Milk was used to the amount of 105,002,000 lb. in 1945 and other materials amounting to 127,052,000 lb.

Margarine was exported in small quantities until 1941, when lend-lease was established; after that time most of the exports were shipped to the British overseas services. The U.S. military forces used about 14,000,000 lb. for feeding prisoners of war in 1945; 7,000,000 lb. was shipped to the soviet union and 2,000,000 lb. to France. The Red

Cross bought 13,000,000 lb. in 1944 and 4,000,000 lb. in 1945, mostly for food parcels for Americans held as prisoners of war. Only small amounts were used for the United States military forces. The average price of margarine was only about half that of butter. During 1945 uncoloured margarine averaged 21.1 cents per lb. compared with 50 cents for butter. United States consumers showed little disposition to substitute margarine for butter even under the most severe rationing. Some agitation for the repeal of the federal tax of ten cents per lb. on coloured margarine was heard without legislative action. The use of coloured margarine increased somewhat but in 1945 still amounted to only 4% of the total amount consumed.

State taxes on margarine in 20 states varied from 5 to 15 cents per lb. in 1946. After 1938 state taxes were removed in Alabama, Nebraska, New Mexico and Oklahoma. Federal taxes continued unchanged after 1931, at ten cents per lb. on coloured margarine, ¼ cent per lb. on uncoloured. Imported margarine was subject to a duty of 14 cents per lb. and a stamp tax of 15 cents per lb. paid by the importer. (J. C. Ms.)

Production of Margarine in the United States, 1937-46
(In pounds)

1937	397,381,000	1942	425,749,000
1938	385,233,000	1943	614,144,000
1939	300,856,000	1944	588,184,000
1940	320,402,000	1945	613,279,000
1941	367,587,000	1946	550,000,000*

*Preliminary estimate.

BIBLIOGRAPHY.—For statistics of consumption, U.S. Dept. Agric., *Agricultural Statistics*; Institute of Margarine Manuf., *Proceedings*.

Marianas Islands

Little known to Americans before World War II, the Marianas by 1946 had assumed considerable importance to the United States, primarily for their strategic military

A U.S. marine patrol on Saipan discovered this frightened Japanese family crouching in a cave during the fighting which took place on the island in June-July 1944



value but also because they furnished landing and refueling facilities for air travel radiating in all directions.

After the principal islands of the group were taken by the U.S. from the Japanese in the summer of 1944, they quickly became powerful bases for air and naval operations against Japan. Hardly an acre of ground was left unused on Saipan and Tinian by occupying forces; while Guam, which the United States had not fortified before the war and which was garrisoned with less than 500 officers and men when the Japanese took it December 12, 1941, quickly became the site of five large air fields as well as a major naval base and a staging area for ground forces. These three islands were crisscrossed with roads, and Guam became advance headquarters for Fleet Admiral C. W. Nimitz, commander in chief of the U.S. Pacific fleet.

The taking of Saipan and retaking of Guam were bloody operations; the Japanese had prepared defenses deep in the rock cliffs, especially on the island originally held by them. Following intensive bombing and shelling by a naval task force of all important islands in the chain, U.S. assault troops went ashore on Saipan June 14, 1944. Because the island had been built up as the principal fortress guarding the southern approaches to Japan and as a major supply base for Nippon's temporary holdings in the South Seas, defending forces put up suicidal resistance.

Organized resistance was declared ended July 8, 1944, after the defenders had lost virtually all their air force in the island group plus most of their remaining carrier-based air arm. Eventual Japanese troop losses in the Marianas were 52,206 killed and 2,659 captured; while U.S. losses were 4,683 killed, 20,839 wounded and missing. By far the greater percent of U.S. wounded were returned to duty within a few weeks.

The victory for the U.S. was rated one of the most significant of the war in the Pacific, causing the fall of the Tojo cabinet at Tokyo.

Beachheads were established on Guam by U.S. forces on July 20, 1944, and organized resistance was declared ended Aug. 9, though several thousand Japanese troops were killed and captured in the jungle and coral-stone caves during the months following. Total Japanese killed on Guam to Dec. 9, 1944; 17,436; total captured, 512. U.S. losses were approximately 1,300 killed, 6,000 wounded and 300 missing.

Civilians on the island, largely Chamorros, who, almost without exception, remained intensely loyal to the U.S. through the Japanese occupation, suffered some cruelty at the hands of their captors.

Schools, churches and some villages, as well as the principal city, Agana, were largely destroyed by bombing and naval fire of U.S. forces in the battle to retake the island.

Almost immediately after organized resistance ceased, however, the island administration—which also became the administration for all the Marianas—began rehabilitating the civil population (estimated at 23,000). Health programs were instituted, a hospital was given the Guamanians, replacing one destroyed during the fighting; schools were re-established in the English language, the school buildings and churches furnished by the U.S.

Approximately 165 teachers, all natives, were in these schools in April 1946, under a native superintendent appointed by the naval commander (governor of the islands). The Guam congress also had been reconstituted, each district electing its officials.

Several thousand Guamanians were employed by military and naval establishments, while an agricultural rehabilitation program, supported by U.S. government funds,



A Liberator of the U.S. 7th army air force taking off from its base in the Marianas to raid Truk and other by-passed Japanese islands in May 1945

helped most of the remaining adults to find immediate employment. Still others engaged in handicrafts, selling their wares at a handsome price to soldiers and sailors. The objectives of the agricultural program were to restore war-damaged coconut plantations, to convert new acreage from jungle into farm land, and to develop dairying and livestock and new types of commercial and food crops.

The Japanese had developed agriculture and industry in the other islands of the Marianas much more highly, before and during the war, than the development on Guam. In 1937, Saipan exported \$6,000,000 worth of sugar, while Guam's total exports were valued at only \$228,229. The small island of Rota had a sugar mill, a railroad and a phosphate plant.

By unanimous vote of the United Nations Security council on April 2, 1947, the United States was given sole trusteeship over the former Japanese mandated islands in the Marianas. (See also GUAM; PACIFIC ISLANDS, MANDATED.)

BIBLIOGRAPHY.—Navy Dept. Communiques, Off. of Pub. Inf. U.S. Navy, Washington, D. C.; Report to United Nations on Guam, etc. (OPBAV-P22-100), (July 1946); Off. of Pub. Inf., U.S. Navy, Washington, D. C.; Willard Price, *Japan's Islands of Mystery*; "Guam Looks to USA," *Asia*, (July 1946); George R. Tweed, *Robinson Crusoe, USN*; Edgar McInnis, *The War*. (U. CE.; R. H. Ws.)

Marie, Queen

Queen Marie of Rumania (1875–1938), was born at Eastwell Park, Kent, in England on Oct. 29, 1875, the eldest daughter of the duke of Edinburgh, Queen Victoria's

second son. On Jan. 10, 1893, she married Prince Ferdinand of Rumania, and as his consort was crowned queen of Rumania on Oct. 15, 1922, reigning until Ferdinand's death on July 20, 1927. Queen Marie visited the United States and Canada in 1926. After King Ferdinand's death she took little part in public life. She died at Pelishor castle, Sinaia, in Rumania, on July 18, 1938.

Marijuana

See CHEMISTRY; PSYCHIATRY.

Marine Biology

In spite of World War II which raged through most of the decade 1937-46, a few marine scientists in some of the more fortunately situated stations throughout the world carried forward research and conducted explorations that added richly to the store of useful knowledge concerning the sea and its living organisms. While considerable routine work found its outlet in the usual published reports and followed the more or less stereotyped descriptive form of previous years, this interval in retrospect seemed unique in that much of the outstanding research resulted from new methods and techniques applied to the solution of the older problems. Some of the more important accomplishments of marine biologists are summarized under each of the several subheadings.

Technical Research.—Well to the forefront came the practical use of the "bathysphere,"^{1,2} a large, heavy, hollow, spherical steel ball in which a scientist could descend to various depths of the sea. There were seen living forms never before viewed by the eyes of man. Among the many lilliputian organisms described, perhaps the most interesting were comparatively small, brilliantly coloured deep-sea fishes. These were characterized as having proportionately very large heads from which protruded protoplasmic stalks bearing luminous organs. The deepest descent recorded was in a limited area of the ocean in close proximity to Bermuda where the bathysphere was lowered to a depth of 3,028 ft. After the forms collected by this means were studied and catalogued, there were found representatives of approximately one-third of all known species of sea-life. The principle of the bathysphere was pronounced "the greatest invention since the diving suit."³

At about the same time⁴ at the Marine Biological station (Woods Hole, Mass.), scientists discovered that sea-urchin eggs, when subjected to great centrifugal force (*i.e.*, 10,000 x), were broken into nucleated and non-nucleated halves. Subsequently on being treated with parthenogenic reagents, the non-nucleated halves underwent cleavage and developed into blastulae, a circumstance which profoundly altered contemporary thought in embryology. It was thought that only cells with the intact nucleus were capable of reproduction and development.

Somewhat later (1939) a deep-sea dredge of new design⁵ was successfully used to obtain mud-core samples ten ft. thick from the ocean floor two mi. deep (Atlantic). From studies of these core-samples, several conclusions were reached; evidence was abundantly clear that there were four ice periods and five warm periods represented; that the magnetic pole had wandered quite widely as evidenced by differently-directed magnetic particles in the different

sedimentary strata; and that strange gigantic shelled animals dominated one era. This device⁶ used in another way furnished data on the rate of sedimentation and age of the various mud-strata. From differential amounts of radium in the core from the deeper to the more superficial layers it was estimated that an interval of approximately 1,000,000 years was required for the deposition of a core 10 ft. thick.

The development of automatic depth-recorders (echo-sounding) and position-finding at sea⁷ contributed greatly to the knowledge of subterranean topography along the shores of the western hemisphere in both the Atlantic and Pacific oceans. From this mass of data it was concluded that the sub-sea configurations are quite like those of the land areas above sea-level; that the sub-continental slopes studied showed definite signs of erosion; that the submarine mountains were weathered and were not mountains of deposition as some had thought; and that the sea level was in earlier times at least 10,000 ft. below its existing level.

One of the most useful devices applied in marine studies came with the development and perfection of the under-sea camera⁸ with a special automatic "trigger" mechanism which activated both the photoflash bulb and the film exposure. This candid camera enabled biologists not only to secure pictures of rare bottom forms, but to secure exposures showing ecological habitats of both marine plants and animals never before observed. A study of exposures over the Georges Banks fishing grounds, just off the New England coast, showed the area literally alive with crabs, sea snails, starfish, sea urchins, sand dollars, deep-sea scallops, tube-building worms and sponges as well as much sea vegetation. These rich biological associations implied that the basic organic synthesis was performed by the pelagic phytoplankton—probably diatoms in the first place, which in turn were consumed by the zooplankton—the copopods; the latter together with others served as the attractive source of food for the commercial fishes taken in such numbers about the Banks. Beyond the use of this in the hands of biologists, geologists and oceanographers⁹ employed it as a material aid in interpreting the effect of tides and currents upon the sea-floor in the formation of "sand-ripples" and submarine canyons. The device also found wide application in diving operations preliminary to actual salvage operations.

Two very practical techniques resulted from the exigencies of World War II. In 1943, the royal Canadian navy¹⁰ first made use of a discovery of "pink pills" as a preventative of, and a cure for, seasickness. In the same year the United States Naval Medical Research institute developed a chemical briquette about the size of a candy bar which was a very successful and efficient "sea water de-salter." Subsequently these briquettes were included in the life-saving packets of navy vessels and overseas planes.

Finally, the radar principle¹¹ met with wide and remarkable success as an electronic navigator on many combat ships of Allied nations during the latter days of the war. Experiment testing sets were successfully employed by the U.S. maritime service in 1945, and gave promise of great usefulness for vessels engaged in scientific exploration of the seas.

Surveys and Expeditions.—During the earlier years of the decade, many surveys and expeditions were completed by scientific and national organizations. These were varied in scope and purpose and not easily evaluated. Several Pacific expeditions of considerable duration were com-

¹See *New York Times* for a popular account (Sept. 3, 1937).

²For earlier work see *National Geographic Magazine*, 59, June 1931; 62, Dec. 1932; and 66, Dec. 1934.

³For diving suit see *Time*, Dec. 13, 1937, p. 52.

⁴*Biological Bulletin*, 73, 343, 1937, also a popular account in *Life*, Sept. 13, 1937, p. 70.

⁵*Science*, Feb. 1939, p. 48.

⁶*Science News*, 93, No. 2406, 1941.

⁷See "Lands Beneath the Sea," *Scientific Monthly*, Nov. 1941.

⁸*Science*, Feb. 7, 1941, B 44.

⁹See *Science Supplement*, Oct. 27, 1944, p. 10; also report in *Life*, Nov. 13, 1944.

¹⁰*Science* 98, Dec. 1943.

¹¹*Science Supplement*, Aug. 1945, vol. 102, p. 10.

pleted off the Central and South American coasts. One sponsored by the American Museum of Natural History¹² collected marine specimens and carried out a research program over an interval of four months off the coast of South America. A similar study was conducted by the sixth Allan Hancock Pacific expedition along the Central American coast. Many rare and unnamed specimens collected by this and a subsequent expedition (the seventh) were studied and donated to scientific institutions along the Pacific coast. A long series of expeditions¹³ under the direction of the U.S. coast guard, known as the Marion and General Greene expeditions to Davis straits and the Labrador sea, was completed. A comprehensive report was published as part two of *Physical Oceanography* by the U.S. printing office. Shortly thereafter, the second Eastern Pacific Zaca expedition¹⁴ was completed. In these studies emphasis was placed upon oecological habits and colour patterns of marine forms rather than upon their structural and taxonomic positions. Much scientific data as well as colourful facts were reported in the book, *The Zaca Venture*.¹⁵

Concerned with the Arctic and Antarctic expeditions, three important reports were made; two under the sponsorship of the Linnean society of London¹⁶ as the result of the expedition of the "Nautilus" to the Arctic waters. One was an extensive monograph on the *copopoda*, and the other concerned the *appendicularians*. It was reported¹⁷ that during the ice "drift" from the north pole to the coast of Greenland, U.S.S.R. scientists accumulated much data on depth soundings, plankton studies, sub-ice water flow and organic life. So far as was known, however, these observations did not find their way into scientific literature of the decade.

The U.S. geophysical expedition¹⁸ to the Southwest Pacific, northeast of New Zealand, resulted in a physical and biological survey of an area of the ocean which was estimated to cover approximately 4,500,000 sq.mi. Most of these data, however, concerned physical features; about the same time Cambridge university, Cambridge, England, completed a biological expedition to Jamaica. The British Museum released part one of its studies of the Great Barrier reef which dealt with studies on rock-destroying molluscs, zooplankton, copopods and crustaceans of that region. The British Museum also released the report on the John Murray expedition (1933-34) dealing with oceanographic and biological surveys of the Indian ocean and the Gulf of Aden. A new oceanographic vessel, the "Culver," was sponsored jointly by the Development Commission of Great Britain and the Royal Society of London and entered upon a long term study of the Gulf stream. The icebreaker "Sedor" (1940) after a drift of 27 months in the Arctic, returned to Murmansk and set out again, sponsored by the geographical department of the U.S.S.R., to explore the Kara sea.

In 1941 the U.S. National Museum¹⁹ issued the sixth volume in the series of the Henry W. Fowler's studies of the fishes collected by the "Albatross" dealing mostly with the primitive fishes of the Philippine Islands. This volume of some 900 pages proved of great value to the systematist as well as to the lay reader.

Reports from the Richard E. Byrd expedition to the Antarctic, covering a three-year period (1939-41), included observations of the aurora, ice formations, ornithological

studies, new details of the Antarctic map, volcanic areas and other topographical details.

Marine Stations and Research Ships.—Three new marine stations were established in 1937; two of them by the U.S.S.R. Academy of Sciences in northern Russia and the other by the British government at Bermuda in the Atlantic. The Bermuda station was dedicated to the study of the pulses of the Gulf stream as these affect marine life. The research ship "Culver" was commissioned to the Bermuda station by the Royal Society of London at the same time (July 16, 1937) that the new ship "Atlantis," of the Woods Hole Oceanographic institute, entered into a joint research program of considerable magnitude. In the same year the British admiralty²⁰ commissioned the "Research" to finish the work of the "Carnegie" which was destroyed by fire in 1929 at Spia, western Samoa. However, much of the earlier data gathered by the "Carnegie" was in safe-keeping and two important contributions, data for which was gathered in 1928-29, appeared in 1943,²¹ *Biology III* and *Biology IV*, published by the Carnegie institute. The Danish government also commissioned a new ship, the "Dana," at a cost of approximately \$500,000 (1,000,000 krone) equipped with all modern devices for scientific research of the sea.

In midsummer 1938 the 50th anniversary of the Marine Biological laboratory at Woods Hole, Mass., the oldest institution of its kind in America, was celebrated. The scientific accomplishments in the field of marine biology throughout the half-century and succeeding span of years were reviewed in a volume²² published in 1944 by its long-time director.

Duke university, Durham, N.C., established a new marine station at Beaufort, N.C., in 1938, and in the following year the South Wales government established a new biological research station at Cronulla. Three new U.S. bureau of fisheries laboratories were established in the same year; one at Pensacola, Fla., on the site of the quarantine station on Ballast, Rock Island. Another was established at the crossroads between North and South America in Puerto Rico, where research concerned advanced methods of fish canning and marketing. A third station was established at Milford, Conn., especially adapted to the research on the propagation of oysters and other commercial molluscs. The marine biological station at Plymouth, England, was seriously damaged by bombing early in 1941, but was later repaired and its research program continued. Limited use of motor boats was also renewed. A similar situation was experienced by the Naples marine station and aquarium.²³ In 1943 the buildings were extensively damaged, but even more unfortunate losses were the long-time specimen collections, the library books and separates. However, in less than a year after the withdrawal of the German troops from Italy the station was revitalized and the research program was re-established by subsidies subscribed by the Royal Society of London.²⁴

Marine Zoology.—In 1937 a most comprehensive study of the salinity and temperature fluctuations of the English channel covering a 25-year interval was released by the

¹²See popular account in *New York Times*, Oct. 12, 1937, p. 9.

¹³"Scientific Results," part 2, *Physical Oceanography*, U.S. Printing Office, Washington D.C., pp. 259, charts and maps.

¹⁴See the book: Wm. Beebe, *Zaca Venture*, 1938; see also *Science*, 87, pp. 522-523.

¹⁵*Ibid.*

¹⁶As reported in *Jour. Linn. Soc.*, London, 39 (367), pp. 391-412, (1937-38).

¹⁷As reported in *Science* 87 (Jan. 1938, pp. 32-33).

¹⁸As reported in *Nature*, July 1939.

¹⁹*Bulletin* 73: 193, U.S. National Museum, Washington, D.C., 1941.

²⁰See brief account of the "Research" and the "Dana," *Science N.S.*, 87:214; also further account of "Research" in *Science N.S.*, Sept. 1938, 88:209.

²¹See scientific results of the cruise of the "Carnegie" during 1928-29 under command of J. P. Ault in *Biology III* by Herbert W. Graham; "Studies in the Morphology, Taxonomy and Ecology of the Piridiniales," Carnegie Institute, Pub. 542, 1943; also see, scientific results of the last cruise of the "Carnegie," *Biology IV*, 8 papers, Carnegie Institute, Pub. 555, 1943.

²²See *The Woods Hole Marine Biological Laboratory*, by Frank R. Lillie, 1944.

²³See *Time*, Oct. 12, 1943.

²⁴*Science*, March 31, 1944, p. 259.

University of Agriculture and Fisheries of Great Britain²⁵ concerning many factors affecting the life of marine organisms in the oceans of the world; two voluminous reports were also issued by the Permanent Council for the Exploration of the Sea.²⁶ These studies concerned rheotaxis, geotaxis, photaxis, habitats and responses of sea animals. Several scientific discoveries of more than ordinary interest were reported concerning life histories and adaptations in fishes. In the matter of protective coloration,²⁷ an exhaustive series of experiments on marine fishes was reported before the National Academy of Sciences. It was concluded from the experiments that fishes with the most perfect adaptive mechanisms suffered least from predatory foes; thus the "protective coloration hypothesis" of the scientists was strongly upheld.

A systematic study was made of the so-called sea horse (*Hippocampus*),²⁸ a fish constituting a curious biological anomaly wherein the male of the species gives birth to the living young. The female places unfertilized eggs, a few at a time, in a pouch-like sac of the male, where in a manner yet unexplained by science at the end of the decade, they are fertilized and undergo development. Some facts²⁹ were reported concerning the rate of growth and number of moults of the lobster. At one year of age it was only 2 in. long and replaced its outside covering (carapace) 16 times; when 10½ in. long it had discarded its old coverings 30 times. A comprehensive report was completed on the marine fauna of the Bristol channel³⁰ concerning Amphipoda, Porifera, Coelenterata and fishes. These data supplemented surveys previously made by the University of Liverpool, England.

From an extensive study of the fishes taken in the brackish waters of the Panama canal³¹ it was deduced that many species found only in the Atlantic migrated into Gatun lake, while others represented typical Pacific ocean forms. In all, representatives of 159 species were identified. A somewhat similar report came from a study of the ichthyofauna of the Laptev sea in the Arctic by Russian scientists. Out of a total of 315 species, certain ones were typical of Atlantic fishes, while others were Pacific forms with definite evidence of interbreeding.

One of the two gobioid fishes new to science collected on the presidential cruise into the Caribbean sea in 1938 was given the name of *Pycnomma roosevelti* in President Roosevelt's honour. One of the most interesting chapters written by nature was translated from the study of the life history of the young sailfish (*Istiophorus grey*).³² While in outward appearance the young sailfish somewhat resembled the adult, its structural anatomy gave no hint of the radical changes that were ontogenetically to come. There was no suggestion of the disappearance of the primitive scales and their replacement by bony scutes, nor the shift from a prehensile snout to a stiffened recoil-guarded appendage resembling a great sword, nor the extensive ossification of the joints so as to form a taut, stiffened body so characteristic of the adult. In the mobile body of the young fish, all these trends in reorganization were held in abeyance.

As a side light on sea warfare,³³ a distressing picture was drawn of the fatal suffering of untold numbers of sea birds that mistook "oil slicks" for quiet sea areas. Since mineral oils break the natural protective film of bird feathers it was stated that oil slicks were responsible for an appalling fatality of ducks, gulls and all other birds which rest upon the sea.

The demand for sea foods of all kinds, especially fish, in maritime countries resulted in notes of alarm on overfishing, and suggested ways and means to correct the practice. In England, a lengthy paper was presented before the Royal society³⁴ concerning the situation in waters of the British Isles and North sea. In Canada³⁵ a similar series of problems confronted the government. In Australia, the Council on Industrial Research³⁶ issued a bulletin which dealt with overfishing of the sea mullet, which also contained suggested remedies. In the Mediterranean,³⁷ however, the problem was how best to meet the demands of the undernourished and starving peoples of southern Europe. The answer was found to some extent in reopening Sardinia's sardine and Sicily's tuna canneries. The age-old problems of the biological fouling of ships' bottoms was attacked from several angles. In a lengthy report³⁸ issued jointly by the Iron and Steel institute and the British Iron and Steel federation, it was concluded that any treatment which hindered the deposition of brine salts by living organisms would counteract fouling. It was said that zeolite or sodium permutit admixed with the anticorrosive paint inhibited the formation of gelatinous calcium carbonate, a medium on which fouling organisms subsisted. While still debatable as to its efficiency for all fouling organisms, the new insecticide DDT (dichlorodiphenyl-trichloroethane), when admixed with anticorrosive paints, was used effectively against barnacles.³⁹ It was said by some⁴⁰ to be inadequate against annelids, bryozoan algae or tunicates.

It was concluded that certain island birds of the Pacific⁴¹ had become extinct since a careful survey of Midway and certain other islands failed to discover either the Laysan rail or the Laysan finch. It was thought also that many other birds were in imminent danger of extinction because of the severe war operations among those islands.

Biological Results of the Bikini Bomb.—Official reports on the effects of the underwater atom bomb explosion at Bikini on marine life were unavailable at the end of 1946, but some interesting facts were released which indicated the direction of the effects, if not the extent, such a bomb has upon aquatic forms. The most serious effect was upon the fishes of the atoll waters, there being little evidence of other biological changes in the lagoon. Some fishes were killed by the explosion and others were killed by radioactivity, but the relative numbers involved in the one or the other of these causes were not yet determined. Specimens of bottom-feeding fishes which were caught after the explosion off Bikini, especially some of the reef fishes, were so radioactive that when they were placed upon photographic plates they took their own pictures. Thus it was postulated that the atom bomb could exert a serious effect on the commercial fisheries of the world—actually as well as genetically—and indirectly have widespread repercussions upon the health and well-being of humans as well as

²⁵This was published by His Majesty's Stationery Office, London, *Series II*, vol. 14:3.

²⁶See, *Rapports et Procès, Verbaux des Réunions*; vol. 101; 1^{ère} Partie et 2^{ème} Partie, *Proc. Nat. Acad. Sci.*, 23, 1937.

²⁷*Scientific Monthly*, July 1937.

²⁸Reported in *Nature Magazine* 31, May 1938, p. 292.

²⁹*Nature* 31, March 1938, p. 148.

³⁰*Nature* 150, 3806, 1942.

³¹*Science Supplement* 8, Aug. 1939.

³²Beebe's Report in *Science* 94, p. 301, Sept. 1941, as a result of collecting done on the "Zaca Venture" (1937).

³³As reported in *Science* 86:2486 (1942) from *Audubon Magazine*.

³⁴*Nature*, 151, 337 (1943).

³⁵*Science*, 98-117 (1943).

³⁶*Nature*, 152:110.

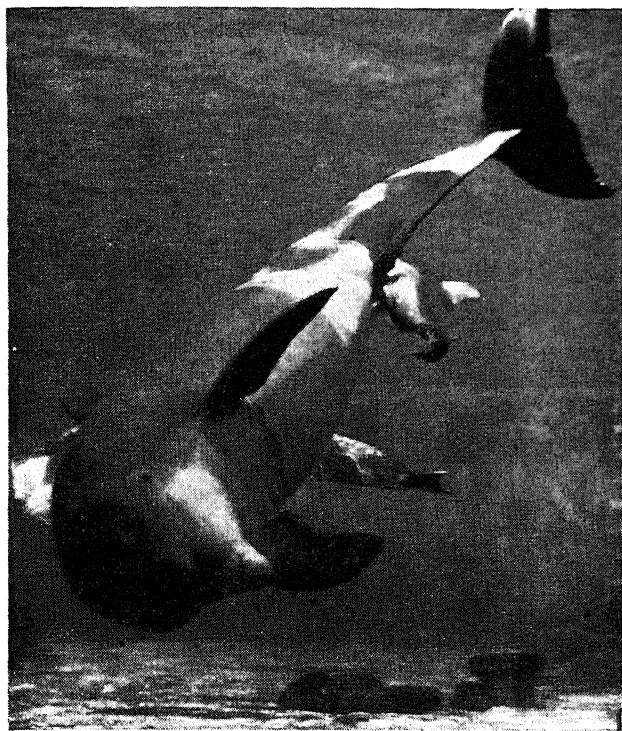
³⁷*Science Supplement* (Nov. 1943).

³⁸See discussion, *Science*, April 1945, vol. 101, p. 406.

³⁹See brief abstract in *Science Supplement*, Aug. 3, 1945, vol. 102, p. 10.

⁴⁰*Science*, Oct. 26, 1945, pp. 425-26.

⁴¹*Science Supplement*, Oct. 19, 1945, p. 14.



First porpoise ever born in captivity, at Marineland, Fla., Feb. 14, 1940

other organisms using them in their dietary.

Marine Botany.—Ever looking to new sources and substances to enrich the sustenance of man, it was not surprising that certain sea plants were made to yield many useful products such as food, fabrics for clothing, fertilizers and drugs.

Taking advantage of advanced biochemical reactions and processes, much research was brought to bear upon the more abundant seaweeds of the shores of continents and many islands. The relative nutritive value of kelp and Irish moss⁴² was ascertained when fed in the dietary of rats. Diets containing approximately 10% kelp increased rate of growth by 20%. Irish moss fed under similar conditions was slightly less effective. It was found that human dietaries benefited similarly when these algae were included.

In a more extensive study⁴³ the nutritive value of the seaweed *Laminaria flexicaulis* was evaluated when used in the dietary of domestic livestock (cattle, sheep, pigs and poultry). This seaweed gathered off the coast of Brittany showed, after being processed into meal, a nutritive assay of three pounds of seaweed meal to four of oatmeal. Similar assays were recognized and put into practice in the U.S. One of the abundant Pacific seaweeds, the giant kelp *Macrocystis pyrifera*, was processed in great volume for feeding purposes. It was discovered by Swedish scientists⁴⁴ that the survival of certain fish larvae during the critical weeks of their existence in the Baltic sea depended upon the quality of the phytoplankton in reference to vitamin D content of the latter. From another seashore plant known as the "devils shoestring," there was extracted an insect-killing drug known as "rotenone." This was a valuable discovery since the chief source of supply had previously been the Netherlands East Indies.⁴⁵

Many of the common seaweeds were demonstrated capa-

ble of forming many by-products, some of which were of commercial use.⁴⁶ From the potash and mineral extractions was derived a third shiny substance called "Algin." Treated with certain reagents, that substance was transformed into "hard rubber"; treated somewhat differently, a film similar to cellophane was formed. It was also spun into thread and was reduced to a white powder which constituted a very satisfactory base for cosmetics, transparencies, plastics, auto polishing powder and creaming agents; it also served as a suspension medium for powdered milk and cocoa. It was reported an excellent sources of glue, gels and mucilage. These commercial applications prompted extensive harvesting and processing organizations.

On the taxonomic side, two epoch-making volumes on the algae were published for the systematist. One dealt with seaweeds of the coast of California.⁴⁷ There were listed in this volume 385 species of marine algae and contained 80% of all known species found along the northern Pacific coast. The other volume was a monumental work from the University Press of Cambridge.⁴⁸ While the title suggests the book deals with the structure and reproduction mainly, it also includes taxonomy, oecology and physiology of these seaweeds. It was reported from the University of Leeds, Scotland,⁴⁹ that a high quality rayon was produced from certain seaweeds (kelp).

The rayon was produced by treating dried seaweed, which contained approximately 40% alginic acid, with an alkali (Na_2CO_3). This treatment formed an alginate rayon of excellent quality and appearance suited to a wide range of dye-fast colours by basic dyes and yarns which were non-inflammable.

It was concluded by scientists at the Marine Biological laboratory of Plymouth, England,⁵⁰ that the autotrophic flagellates and peridinians together constituted the larger proportion of the oceanic phytoplankton; the former form outnumbered the latter by a small margin. (See also BOTANY; EXPLORATION, POLAR; FISHERIES; GEOLOGY; ZOOLOGY.)

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Marine Corps, U.S.

When the undeclared Sino-Japanese War mounted to full fury during the summer of 1937, the 4th marine regiment was stationed at Shanghai and a guard of 500 marines was maintained at the U.S. embassy in Peiping. Landing forces, including marine detachments from vessels of the Asiatic fleet, reinforced the 4th regiment in Sept. 1937, and two companies were rushed from Cavite, P.I., naval base. By the middle of the month the forces at Shanghai had been formed into the 2nd brigade, with a strength of 2,536 men for the defense of the neutrality of the International Settlement. In Feb. 1938, fighting moved west of Shanghai and the brigade was withdrawn to San Diego, leaving the 4th regiment to garrison Shanghai. The regiment was finally moved to the Philippines in Nov. 1941.

Under an act of congress of 1919 the strength of the marine corps had been set at 1,093 officers and 27,400 enlisted men. This strength had never been actually reached, and in 1933 the corps had been reduced in enlisted personnel to slightly more than 15,000 by an economy act. In spite of the shortage of personnel, great progress had been made in the study of amphibious warfare.

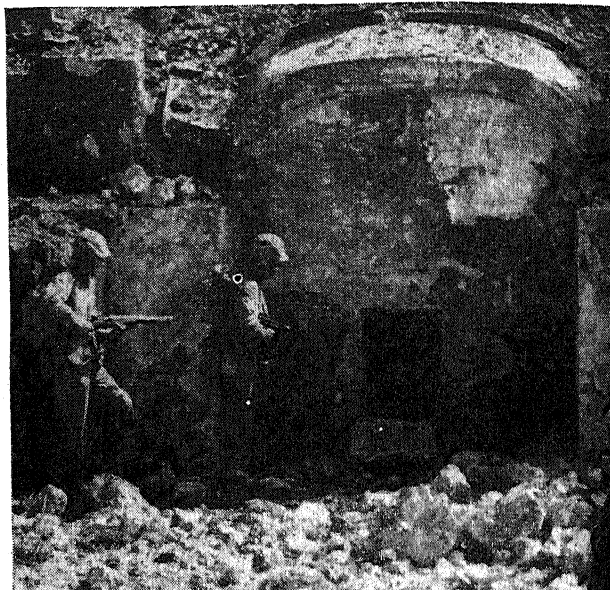
This study, which began after World War I, had resulted in the establishment of the fleet marine force in 1933. Manoeuvres were held each year thereafter with the fleet, and the body of amphibious tactics evolved in these manoeuvres was standardized in 1938. This doctrine, with minor changes, was used throughout World War II by army, navy and marine forces and was adopted by all the major amphibious forces of the world.

Recommendations and experiments in the manoeuvres in the Caribbean and in the Pacific led to the development of the amphibious tractor and the landing craft which were major weapons in World War II.

Marine aviation units were also assigned to the fleet marine force for the purpose of providing close air support from carriers and land bases, a practice which became standard during the amphibious operations of World War II.

As the United States began to build up its defenses in anticipation of war, the strength of the marine corps was slowly increased to 29,612 in 1940. Continued increases brought total strength to 66,041 on Dec. 7, 1941. In the meantime, a marine brigade of 4,095 men had been sent in July 1941 to Iceland, where elements remained until the end of 1942 in defense of that base. Stations from the Philippines to the leased bases in the Atlantic also had increased marine garrisons during 1941, and two divisions were formed. Elements of the 2nd division moved to the Samoan Islands in Jan. 1942, to protect that vital base.

With U.S. entry into the war, the marines first went into action at Wake and Bataan. A small garrison of 378 marines on Wake Island (*q.v.*) withstood heavy Japanese



U.S. marines, newly landed at Okinawa, closing in on Japanese snipers hidden in a burial vault near the town of Sobe. The town was taken within an hour of the first landings on April 1, 1945

attacks for two weeks in Dec. 1941 before they were finally forced to surrender after inflicting heavy damage.

The 4th regiment, withdrawn from Shanghai, participated in the defense of Bataan and Corregidor (*q.v.*) and a marine detachment on Midway (*q.v.*) successfully withstood repeated Japanese aerial assaults. Small detachments at Guam and Peiping were captured.

In Aug. 1942, the 1st marine division, reinforced, struck the first land offensive blow of the war, seizing Tulagi, Florida, Gavutu and Tanambogo islands and establishing a beachhead on Guadalcanal, in the British Solomon Islands (*q.v.*). The 19,119 officers and men of the division, semi-isolated by furious naval battles, seized and defended Henderson field on Guadalcanal against Japanese forces which were gradually reinforced to an estimated strength of 50,000. When the marines were relieved by army troops in Dec. 1942, they had control of a beachhead 10 mi. long and 5 mi. deep and had killed 26,000 Japanese troops while losing 1,121 killed and 2,672 wounded.

During 1943 units of the 1st marine amphibious corps joined with army forces in consolidating the central Solomons, making landings on New Georgia, Rendova and Arundel islands. In November the 3rd marine division seized a beachhead on Bougainville, completing the circle of Allied bases in the Solomons, while the 2nd marine division, as part of the 5th amphibious corps, opened the drive across the central Pacific by seizing Tarawa atoll. The marines stormed heavily fortified Betio Island and destroyed its 4,000 defenders at a cost of 985 killed and 2,167 wounded in a bitter four-day assault. (See GILBERT ISLANDS.)

In Dec. 1943, the 1st marine division began the seizure of Cape Gloucester, sealing off the western end of New Britain, largest island of the Bismarck archipelago.

During Feb. 1944, marines joined in the attack on the Japanese-mandated Marshall Islands (*q.v.*). The 4th division seized Roi and Namur islands, as well as 55 smaller islands. In the second phase, the 22nd regiment, assisted by an army unit, captured Eniwetok atoll with its fleet anchorage. Marine corps casualties for the Marshalls campaign were 430 killed and 1,363 wounded, while the Japanese suffered 6,639 casualties.

Emirau Island in the St. Matthias group was seized in

March without a fight and in June the 5th amphibious corps began the bloody assault on the vital Marianas Islands (*q.v.*). Supported by the greatest fleet concentration ever used up to that time, the 2nd and 4th marine divisions landed and overwhelmed the fanatical Japanese defense of Saipan in three weeks of extremely severe fighting. They were aided by the 27th army division. In July the 3rd marine division, the 1st provisional marine brigade and the 77th army division recaptured Guam (*q.v.*) while the 2nd and 4th marine divisions reduced Tinian in eight days after achieving tactical surprise by landing over narrow beaches considered by the Japanese as impracticable for a main attack.

A total of 20,183 casualties were suffered by marines in the Marianas fighting, while 53,569 were inflicted on the Japanese by combined forces.

In Sept. 1944 the 1st marine division destroyed 12,000 fanatical defenders on Peleliu in the Palau Islands in a grueling one-month battle which cost 6,298 marine casualties.

The Japanese defended their islands during 1945 with increased fanaticism and tenacity. The 5th amphibious corps, composed of the 3rd, 4th and 5th marine divisions, engaged in 26 days of the most violent battle to reduce the heavily fortified volcanic island of Iwo Jima (*q.v.*) in the Bonin group. Smashing through a network of underground fortifications, the marines counted 21,000 of the estimated 23,000 defense troops as dead, with others buried in their defenses. The marine forces sustained 21,406 total casualties, which included more than 5,528 dead.

In April 1945 the 3rd amphibious corps landed on Okinawa (*q.v.*) in the Ryukyus, forming with the 24th army corps the 10th army. The landing was unopposed, and the 1st and 6th marine divisions fanned rapidly northward from the initial beachhead, securing the north 30 miles of the island by cleaning out Motobu peninsula in three weeks against moderate resistance.

The 24th army corps, meanwhile, had found the Japanese entrenched in the powerful Shuri line, one of the strongest defensive positions encountered in the Pacific. In May the marine divisions were committed against this line. The 6th division broke through the western anchor at the capital city of Naha, crossing the Asato river and beating back furious counterattacks.

The 1st division pierced to Shuri castle, the heart of the defensive system, by a surprise infantry assault through heavy mud which prevented the use of armour or vehicles. The island was secured in June, after 83 days of battle which cost the Japanese 111,351 casualties. U.S. forces suffered 11,879 killed or missing and 46,319 wounded. Marine casualties were 3,145 killed and 14,527 wounded.

The marine corps had reached a maximum strength of 485,934 during World War II and suffered 84,812 battle casualties, including 19,549 killed.

A total of 596,182 men and women served in the marine corps during the period of hostilities. Of these, the majority totalling 396,767, formed the fleet marine force. At its greatest strength the F.M.F. was composed of two amphibious corps, the 3rd and 5th, with six divisions and five air wings which were assigned to a corps as needed for a specific operation. Special troops, such as reconnaissance elements and defense battalions, were also included.

A total of 22,466 marines, enough to comprise a reinforced division, were stationed aboard the capital ships of the fleet and participated in every major naval action. Detachments of marines from battleships participated in limited land actions in connection with the landings in

North Africa, Italy, Normandy and southern France.

A total of 528,496 marines served overseas during the war, including approximately 98% of all officers and 89% of all enlisted personnel. In addition to the fleet marine force and ships' detachments, marines served outside the U.S. continental limits as garrison forces and guard detachments for naval establishments.

Aviation personnel serving outside the continental limits totalled 93,796. Besides providing close support for ground forces of the fleet marine force, marine aviators were assigned the mission of neutralizing certain Japanese bases, notably Rabaul and the by-passed atolls of the eastern Marshall Islands.

Aviation and artillery units supported army troops during the reconquest of the Philippine Islands. Adoption of suicide tactics by Japanese pilots in attacking the U.S. fleet necessitated the replacement of dive bombers by fighter aircraft aboard the carriers. Marine fighter squadrons were installed on eight carriers during 1945 and participated in strikes against the Japanese homeland as well as the defense of the fleet. In 1946 marine squadrons were retained aboard six carriers.

The strategic use of the fleet marine force in combatant action throughout World War II demonstrated for the first time since the Allied fiasco at Gallipoli in 1915 that an amphibious landing could be made in the face of modern defenses. The unchallenged surge of the Japanese amphibious forces toward Australia was halted in the Solomons by the employment of land, sea and air arms in the closest co-ordination. Without the previous training and established doctrine derived from the manoeuvres of the fleet marine force with the fleet before the war, the Allies could not have undertaken to stop the Japanese offensive at that time.

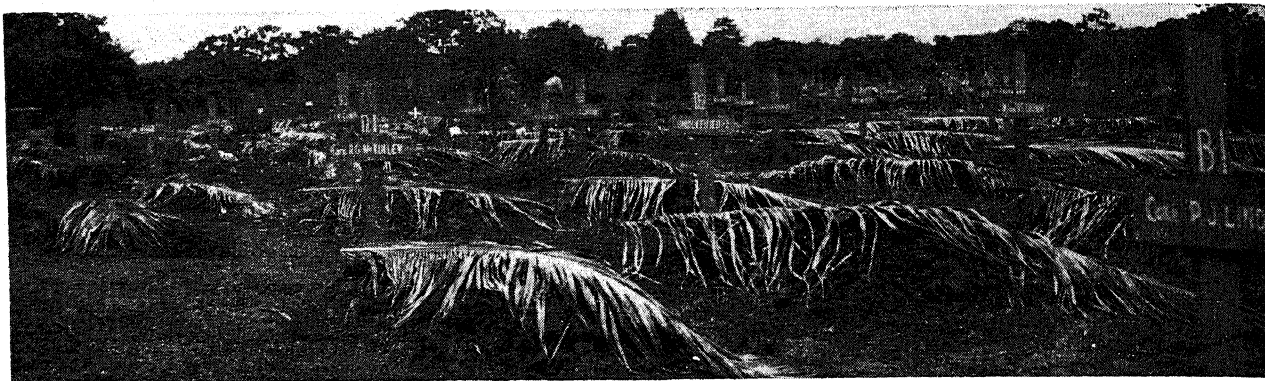
Close support by aviation units was provided throughout the consolidation of the Solomons, and the neutralization by air of the northernmost Japanese bases there precluded the need for further landings.

In the drive across the central Pacific the mission of the fleet marine force was to seize the advance bases needed by the fleet in what was essentially a naval war.

The advance into the Marianas brought an anticipated violent reaction from the Japanese in view of the fact that their home islands were brought within range of both ships and planes. Increasing success by the B-29 long-range bombers based in the Marianas was hampered by the lack of fighter escort and Japanese interference from bases in the Bonins. Consequently, the 5th corps of the fleet marine force was assigned the mission of reducing the formidable bastion at Iwo Jima by amphibious assault. The successful landing was made possible only by overwhelming naval and air superiority provided by the fleet. The seizure of Iwo Jima provided an advance base in this case for planes.

The fleet marine force then helped to complete the purely naval advance which reached its high point at Okinawa. The seizure of Okinawa with its many potential airfields placed all of Japan within range of medium bombers, protecting fleet operations in Japanese home waters. The seizure of Okinawa also provided the staging area and the final springboard for the assault on Japan which was planned for the end of 1945.

Following the Japanese surrender, two marine regiments, one formed from marine detachments of the 3rd fleet, took part in the initial occupation of Honshu. The 5th amphibious corps, composed of the 2nd and 5th ma-



Palm fronds covering the simple graves of U.S. marines killed in action during the first attack on Guadalcanal in Aug. 1942

rine divisions, then landed on Kyushu and in Yamaguchi prefecture of Honshu as occupation troops. In Dec. 1945, the 5th division and corps were deactivated, and the 2nd division returned to the United States in Aug. 1946.

The 3rd amphibious corps, composed of the 1st and 6th marine divisions, was landed in North China to enforce the surrender of Japanese elements there late in Sept. 1945. Threats of civil war between the Chinese nationalist government and communist forces led to the retention of the 1st marine division, reinforced, with garrisons in Hopei and Shantung provinces to protect vital mines, railways and ports supplying the cities of North China.

By the end of 1946 the marine corps was reduced to the peacetime strength authorized by congress that year of 100,000 enlisted men, 7,000 officers and 1,200 warrant officers. An enlarged reserve was also authorized.

General A. A. Vandegrift was commandant of the marine corps in 1946, being stationed at administrative headquarters at the navy department in Washington, D.C. He succeeded Lieut. Gen. Thomas Holcomb in Jan. 1944.

The marine corps was organized with shore establishments and units of the fleet marine force on each coast, ready for action with the Atlantic or Pacific fleet. The most important posts and stations were: Camp Joseph H. Pendleton, at Oceanside, Calif.; El Toro and Miramar air stations, in California; Camp Lejeune, N.C.; Marine Barracks, Quantico, Va.; and Marine Air Station, Cherry Point, N.C. All except Quantico were constructed in the period 1941-45.

Basic training for marine recruits during World War II centred at Parris Island, S.C., and the Marine Corps Base at San Diego, Calif., and plans were made to continue their operation. Military schools and research were carried on at Quantico. (A. A. V.)

Women's Reserve.—The marine corps women's reserve was the last of the women's military services of the United States to be organized; but the prestige of the corps and the fact that it was willing to call its women reservists "marines," instead of giving them a nickname, resulted in its speedily attracting a fine type of young woman.

On Feb. 13, 1943, General Thomas Holcomb—then commandant of the marine corps—announced that 18,000 enlisted women and 1,000 officers were needed for the women's reserve. This quota was reached in June 1944, less than 16 months after the first announcement had been made, and thereafter only sufficient recruiting was done to supply replacements for normal attrition.

Recruits came from all parts of the country; but the greatest number came from the northeastern, north central and Pacific coast states. The eligible ages for enlisted women were 20 to 36 years inclusive; but the average age proved to be 23½ years.

Only two years of high school were required for enlisted women, but all except 13% had more than this education; 65% had completed high school and 22% had had some college work. It is also interesting to note that 88% of recruits had army general classification test scores between 89 and 129; 6% had lower scores than 89 and were almost equally balanced by 6% who had test scores between 130 and 151. This high level of intelligence and education undoubtedly had much to do with the fine standard of efficiency and behaviour later attained by members of the marine corps women's reserve.

Through the co-operation of the U.S. navy and Capt. Mildred H. McAfee, director of the WAVES, the first enlisted women marines and the first officer candidates received their basic training in navy schools. But in July 1943, as soon as enough women officers and enlisted women had been trained to provide a skeleton staff for its own schools, the basic training for all members of the marine corps women's reserve was moved to Camp Lejeune, N.C. This was a permanent marine corps camp for men and afforded very good accommodations and training opportunities. Recruit depot and officer training school continued to operate there until the end of the war; and women reservists also attended with the men such advanced schools as quartermaster, motor transport, cooks and bakers and paymaster. Other women reservists—particularly aviation personnel—took advanced training in navy schools, both clerical and mechanical.

Special efforts were made through interviews and aptitude tests to fit the women to the jobs. About 65% of the women had held clerical jobs in civilian life, and a similar percentage held such jobs in the marine corps, though the individuals were not necessarily the same. For instance, at headquarters, marine corps, where a great deal of clerical work was required, 87% of the enlisted personnel were women reservists. Those not engaged in clerical work filled a wide variety of jobs, a considerable number of them being of a mechanical nature.

Eighteen months from the time the first announcement of a women's reserve was made, its members constituted from one-half to two-thirds of the permanent personnel, at marine camps along the Atlantic and Pacific coasts. They helped in the training, processing and supply of the combat units which passed through them; and also in the maintenance and operation of the camp services. They also did all the work required to make their own units self-supporting. In Aug. 1945, there were 28 units, composed of 579 officers and 14,252 enlisted women serving under women commanding officers in the United States. There were also 17 smaller units, consisting of 102 officers and 1,876 enlisted women, and a few others were on scat-

tered, specialist duties, such as recruiting.

On Sept. 27, 1944, congress amended the Naval Reserve act to permit women to serve on duty in the Territory of Hawaii upon their prior request. The first volunteers arrived in Honolulu on Jan. 28, 1945; and by August of that year there were 34 officers and 580 enlisted women in the women's reserve battalion at Pearl Harbor, and 21 officers and 366 enlisted women in the women's reserve squadron at the marine corps air station at Ewa.

The surrender of Japan on Aug. 14, 1945, came exactly two and a half years after the formation of the marine corps women's reserve. It found that organization at a total strength of 831 officers and 17,714 enlisted women.

It then became important to demobilize this group as fairly and steadily as possible, without interfering with the orderly demobilization of men who had seen combat. Women reservists were discharged on the basis of credits, which in most cases were based on length of service only. After V-E day, special concessions were made to wives of men discharged from military service; and after Sept. 1, 1945, such women were automatically discharged upon their own request, as were also any women more than 35 years of age. As the system of credits worked out, it appeared that the great majority of women served approximately two years in the marine corps women's reserve.

On Dec. 7, 1945, Col. Ruth Cheney Streeter, the first director, resigned her commission and was succeeded by Col. Katherine A. Towle. The difficult and delicate task of orderly demobilization was carried out under her supervision. She also developed plans for organizing and training a postwar women's reserve. Since all women reservists except a few who had volunteered to remain on duty at headquarters, marine corps, were scheduled for discharge before Sept. 1, 1946, Col. Towle in turn submitted her resignation as director.

Postwar plans did not call for retaining any substantial number of women reservists on full-time duty; but Gen. A. A. Vandegrift, commandant of the marine corps, stated that the corps would like to train a part-time women's reserve of 500 officers and 4,500 enlisted women, which would be capable of rapid expansion in case of need. On Sept. 5, 1946, Major Julia E. Hamblet was appointed director, to develop such an organization. (R. C. Sr.)

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Marine Insurance

See INSURANCE.

Market Gardening

See VEGETABLES.

Marketing

See BUSINESS REVIEW.

Marriage and Divorce

U.S. family life during the decade 1937-46 revealed the consequences of an unprecedented period of storm and stress. As various studies of the family had demonstrated, the domestic institution was already encountering rough passage as it attempted to adjust to the social changes of the 20th century and the shift from the traditions of a rural economy to a dominant urban modern culture. Then, before reaching any measure of security, it had to meet the new impact of two catastrophes—the depression beginning in 1929 and World War II.

One expression of the inward instability of the family

was the increasing divorce rate. As had been expected, the war accelerated this trend. First of all, it reversed the influence of the depression, which had delayed and discouraged marriage. A considerable part of the increase in marriages during the war years came from reckless and even insincere mating. It was apparent to students of the family that, as was true after World War I, a great many of these war marriages would end in divorce. This occurred everywhere in the world where there had been social disturbance because of World War II and legal opportunity to obtain release from domestic dissatisfaction. This stimulus to divorce in turn became a social influence affecting some husbands and wives who in a more stable period would solve their domestic difficulties and achieve an enduring marriage.

The draft act became a major influence. Although it delayed some marriages it hastened more and led some to become parents who had either postponed the coming of children or had planned to have none at all. As soon as preparation for national defense became an avowed governmental policy the effect of war industry upon marriage was apparent. Multitudes of men and women moved from the country, village and small city to the great industrial centres, attracted by the opportunities offered by the production of war materials. Marriages increased in 30 of the largest cities possessing about 1/4 of the nation's population. The increase was especially great where shipbuilding, naval and aviation industries flourished. During the first 11 months of 1941 marriages gained 8.8% over the previous year for the same period.

The migration to industrial centres affected family life in many ways. Most obvious was the great overcrowding. Housing facilities were far behind the needs. Slum conditions were re-created in some localities. Everywhere living conditions were abnormal. In many homes there were sudden changes in the standard of living not always leading to a rational household program. Frequently both the father and the mother went outside the home to work, and in spite of public effort to take care of this problem a portion of these families were undermined and their children neglected. Abnormally high war wages raised the income of many families; increased taxation and higher prices lowered that of others.

When the United States actively entered World War II these disturbances increased and new ones were added. As a multitude of men and some women went into the armed forces, many homes were temporarily broken. There were more hasty and thoughtless marriages. Young men were moved from accustomed social surroundings and thrown without needed preparation into alien countries with the consequence that, upon their return to the United States, some could not, or could not easily, adjust to their former family life. Once casualties began to occur, homes were permanently broken; in many such families husband and wife had lived together only a few weeks or months. Children appeared in homes where there were no fathers. There was a decided shift in the sex ratio of the country, especially where war industries concentrated, removing from many women opportunity for normal courtship and adding strength to the already existing trend toward greater sex freedom and promiscuity.

The most significant and alarming expression of this greater sex freedom appeared in the startling increase of delinquency, especially among teen-age girls (see CRIME). This indication of social disorganization among young girlhood was in its size, a new national experience. World

War I had upset the U.S. moral code less and had chiefly affected the older adolescents. The longer World War II continued the more apparent it became that no portion of the population was being more disturbed than the teen-age group. This problem of delinquency persisted in the postwar era. The testimony of social workers as to the magnitude of teen-age delinquency, at least in part a consequence of the war, was brought out in John Edgar Hoover's annual statements of arrests. During the first six months of 1943 as compared with a similar period in the previous year the increase in the delinquency of girls under 21 years of age was 64.7%. More impressive was the fact that there were more arrests during this six months period than for the entire 1941 calendar year. For offenses against common decency the number of girls under 21 years of age arrested during the first half of 1943 increased 89.5%. Reports of delinquency as a result of maladjustment among youth, especially girls, came from every section of the nation, especially from cities and communities near war camps. One of the most startling evidences was the increase in cases of syphilis among boys and girls between 15 and 20 years of age. The New York health department reported that primary and secondary syphilis increased 37% during 1942 as compared with the period from 1939-41.

The trend in arrests was a significant portrayal of the delinquency situation but not the only evidence. Cases of young girls taking part in holdups and even murder gave spectacular emphasis to the profound social disorganization experienced by youth as a result of the war conditions, principally the lack of family discipline. The situation in 1945 revealed that peace had not ended the abnormal situation. In that year, 30.1% of the rapes were committed by persons under 21, as were 33.5% of the larcenies, 35.2% of the robberies, 49.8% of the burglaries, 61.1% of the car thefts.

* * *

THE SHORTAGE of labour in war industries created a demand for youthful workers. During 1943 and 1944, 27 states modified child labour laws, though the majority of these changes were only for the duration of World War II. In addition there were 15 administrative rulings which made it easier for minors to be employed. In some homes trouble came because these youths who ordinarily would have been at school were working and earning more than the father. Thus they were naturally unwilling in many instances to accept the discipline which under normal conditions would have been taken as a matter of course.

Not only did World War II rearrange the accustomed patterns of courtship; it also frequently prevented the normal building of a home. After marriage the bride had to live either with her own parents or with her husband's while he was stationed at a distance. This arrangement, always hazardous, was especially so during the stress of war. It took considerable time for letters to go back and forth; any friction that developed between the young wife and her parents or in-laws, if expressed in correspondence with the husband, easily led to a feeling of frustration that became a wedge between husband and wife. Such friction was the greater because often the two young people had been together too short a time to develop the sense of union which they so greatly needed for a struggle with circumstances not to their liking.

The experiences of war also brought about personality changes which in some instances destroyed the harmony of

husband and wife relations. These changes took many forms with consequences affecting marriage. Some husbands returned physically mutilated; some suffered from mental shock even to the point of developing mental disease; others were too thoughtful, too mature and too serious to fall back into ways once accepted and still preferred by the wife. Some husbands became enamoured of other women, too often themselves married, and insisted upon a divorce. Some returned to find that their wives had been promiscuous or had fallen in love with some other man. Other husbands experienced suspicion or jealousy for which there was no basis but which nevertheless destroyed marriage harmony. Even the unwillingness of some women to return to housekeeping after having enjoyed a different kind of occupation during the wartime became a motive for divorce.

Of all the peacetime problems which struck against the marriage happiness of veterans, none proved so great as the lack of housing. Thousands of men who dreamed of their return to a normal home life found that this was denied them merely because they could not find suitable quarters. Population displacement, the lack of new construction because industry had concentrated on munitions and other matériel of war and the increased population all worked together to bring about a situation which not only led to bitterness and disillusionment but often removed privacy and made living uncomfortable—both serious handicaps to a normal marriage.

Distribution of Families by Marital Status of Family Head, United States, 1940

Marital Status of Family Head	Percent Distribution					
	Of All Families	Of Broken Families				
	Total	Male Head	Female Head	Total	Male Head	Female Head
All families	100.0	84.7	15.3			
Natural families (husband and wife present) . . .	75.8	75.8	—			
Family head single	6.4	3.8	2.6			
Broken families	17.8	5.1	12.7	100.0	28.9	71.1
Widowed	12.7	3.3	9.4	71.1	18.7	52.4
Divorced	1.6	.5	1.1	9.3	3.1	6.2
Separated	3.5	1.3	2.2	19.6	7.1	12.5

Source: U.S. Bureau of the Census, *Population, Types of Families, 1940*, Washington, D.C., 1943.

A study by the American Institute of Family Relations of divorces in Los Angeles county showed a higher proportion of marriages which lasted not more than a year and of childless marriages than ever before. From the 1945 docket of the Los Angeles county superior court, 547 cases were studied. The marriages of these couples had a mean duration of 6.1 years as compared with a similar sample taken from the same court in 1933, when the average duration was 9.27 years. Of the divorces for 1945 23% came from marriages that had lasted a year or less; 67% had lasted less than 4 years, contrasted with 45% in 1933. Of the 1945 group 58% were childless as 45% had been in the earlier period. This trend discovered in Los Angeles was probably representative of a significant tendency in the United States not to struggle long against marital unhappiness.

Although not entirely a product of war marriages, the trend had been accelerated by marriages based on short acquaintance or on hasty decision.

It would be a distortion of the facts to credit World War II only with liabilities for marriage and family life even though this was its greater contribution. War conditions augmented and accelerated some movements which tended to strengthen and improve family life. A summary of significant changes in domestic relations brought this fact out. Some changes had to do with the functioning of the family and some with its composition. One important indication of progress affecting the former resulted

from the appropriation of \$1,500,000 in connection with the Social Security act which was passed in 1935. This sum provided for grants-in-aid to help states develop their child welfare services. At that time, although every state had laws for the care and protection of children, only 26 had welfare departments with responsibility for conducting or synthesizing the child welfare services on a state-wide basis. In 1946 every state and the three territories of Alaska, Hawaii and Puerto Rico recognized by law their responsibility for maintaining and directing services for the welfare and protection of children. The federal appropriation became a stimulus for increasing and expanding work under the auspices of the state and local community. In every state new services were inaugurated, and those already in operation were improved. Professional standards were raised. In 1945 17 of the states made provision for the employment of psychiatrists or psychologists as technical consultants. New laws were passed or old ones improved in order to safeguard child welfare. When World War II came it proved fortunate that this nation-wide effort to safeguard child life was well established and able to provide new facilities during the emergency and to resist the pressure to lower restrictions on child labour without regard to future consequences on marriage and family life.

A great number of mothers with small children entered industry, thereby creating a very great need for the expansion of nursery service. Various programs were carried through, each adapted to the local situation and recognizing differences in the demands made by older and younger children. The community programs for taking care of these children were made as economical as was consistent with good standards of service. Needs of the national war effort and those of individual families and children were recognized; neither was unduly compromised for the advantage of the other. Changing conditions in the communities and in families also had to be provided for, since a static program would have proved unsatisfactory. A counselling service became a necessity. Otherwise the mothers not only found difficulty in meeting their domestic problems but grew restless and discontented in their work. Although day-care nurseries and other centres for the care and supervision of children of employed mothers did not entirely remove the risks these children faced in the war

emergency, they greatly lessened the problems that concerned the future welfare of family life.

Women volunteers were trained for the work and reinforced the inadequate staff of social workers and child specialists.

* * *

ONE OF the most successful of the various activities carried on in association with the social security program had to do with problems of maternal health. One aspect was the protection of the woman in industry who became pregnant. The following principles were observed: opportunity was provided for adequate prenatal care, provision was made for the woman's having sufficient time off before delivery to prepare her for the experience and to prevent strain during the latter part of her pregnancy. It seemed wise also for the women to avoid the night shift, including the hours from 12 midnight to 6:30 A.M. They also were not allowed to work more than 8 hours a day or more than 48 hours a week. The women were prohibited from entering occupations involving heavy lifting, continuous standing on their feet, or any kind of work that exposed them to special risk of accident or to toxic substances. The women already in such occupations were placed in other work. It was also recognized that it was desirable for the woman to be free to leave at any time during her pregnancy if her physician decided that this was desirable.

The enactment of federal provision providing prenatal care for the wives of men in the armed services contributed greatly to the encouraging decrease in maternal deaths. This progress, relatively slight up to 1936, increased rapidly after that time. The period of greatest reduction was during the time of greater state and local activity in maternal and child health work as a result of federal and state co-operation under the Social Security act. The decrease for white women was 48% from 1930 to 1940; for Negro women 34%.

During the same period there was also a decrease of 28% in infant mortality. In the five-year period 1936-40, as compared with 1931-35, there was a reduction of 27% in the maternal death rate. This was the result of better medical care and supervision, since the reduction was largest for deaths from infection, 31%, deaths from tox-

Men and women at the Marriage and Family council, Chapel Hill, North Carolina, in 1941, attending an instruction class in courtship and preparation for marriage



aemias, 24%, from haemorrhages, trauma or shock, 16%. The decrease in infant mortality rate for the five-year period compared with the earlier five years was 12%. These decreases in mortality rates were equivalent to the saving of the lives of 18,550 mothers and 80,901 infants. Progress was also explained in part by the fact that in 1935, 37% of live births occurred in hospitals, but in 1940 it had risen to 56%. The proportion of births with no medical attendance decreased from 12% in 1935 to 9% in 1940.

There could hardly be any contribution to the function of family life more valuable to society and the individual home than this lifting of the standards of maternal care and the lessening of the infant death rate. There was considerable variation between the states. The south had the highest maternal mortality rate; it was more than two and a half times as high for Negro women as white. Nevertheless, the death rate was lowered for both groups, and the higher standard of medical care represented an advance that was not confined to its immediate objective, pregnancy and childbirth.

Another factor in the function of the family was the decrease in the age of mothers. In 1920, 8.6% of the total births were to mothers under 20 years of age. In 1935 it was 11% and the same again in 1940. Women 20-24 years of age represented 28.1% of the total in 1920 and 31.3% in 1940. The years of World War II increased the birth rate among young mothers. This trend contributed somewhat to the lowering of the death rate, since medical records showed that the most healthful age for child-bearing is the decade from 20-29.

Since the birth rate had increased 30% in the United States between 1933 and 1943, it might be assumed that the American family was growing larger. The fact was, however, that this increase came almost entirely from the rise in the marriage rate and the greater number of one and two child families of young married couples. During the depression there was a falling off of marriages leading to a deficit of nearly 800,000. This trend was reversed between 1933 and 1941. In 1942 the marriage rate reached an all-time high; this was followed the next year by the largest number of babies born in U.S. history, more than 3,000,000. A larger number of medium-sized families rather than a relatively small number of large families was to be preferred, since it distributed the values of parenthood to a larger number of persons and provided more favourable economic and social conditions for the average child.

Analysis of the 1940 census data confirmed the conclusions of previous sample studies, that the birth rate was lower among those with the advantages of higher education. Native white women aged 15-49 who had 4 years or more of college education gave birth to slightly less than $1\frac{1}{4}$ children per woman and thus failed to replace the population by 45%. Native white women in the same age group who were graduates of high school gave birth to $1\frac{3}{4}$ children per woman. Their failure to replace was 21%. Native white women in that age group who had completed only 1-4 years of grade school had a record of $4\frac{1}{8}$ children and had over-replaced by 95%. The record for women aged 30-34 years who had not completed their families in 1940 and who had children ranging from 5-20 years of age revealed a still greater difference. Those who had 4 or more years of college had only .7 of one child per woman; graduates of high school had 1.2 while those with only 1-4 years of grade school had more than 3 children per woman. The birth rate of those who had not gone beyond

6th grade in the age group 20-29 was 6 times as high as that of women who had completed 4 years or more of college.

Analysis of the birth rate on an economic basis disclosed that, in the middle class, those homes with a monthly rental ranging from \$30 to \$49 lost most ground in the birth rate. Women aged 45-49 years whose homes ranged from \$5 to \$14 in monthly rental value had had twice as many children per woman as women in the same group whose homes ranged from \$40 to \$100. The rate of those in the middle group with a rental value of \$50 to \$99 was $1\frac{3}{4}$ children. The highest rate of increase was found among those whose homes ranged in value from less than \$5 to \$14 monthly rental. Their record was 4.2 children per woman; while the other 2 classes under-replaced the population, they over-replaced it by 76%. This trend toward the relative lessening of the middle class, which had always acted as a cushion between the other two and had thereby contributed to the stabilizing of society, continued throughout the decade 1937-46.

* * *

A STRUCTURAL CHANGE favourable to national welfare, on the other hand, was the tendency toward more inter-marriage among national groups. A study of marriages in New York state, exclusive of New York city, permitting comparison between 1928 and 1941 showed that nearly every one of the national groups had been increasingly marrying with other stocks. Couples born in the United States of foreign or mixed parentage were increasingly marrying into families of other national origins than their own. The same trend was observed in the case of foreign-born women. A striking illustration was the increase of women born in England, Scotland or Wales and married in New York. In 1920 63.8% of these women married men born in one of those countries. In 1940 the percentage became 44.4. There was, however, little change in the habit of native Italian women marrying within their own national group.

A significant structural trend in U.S. population was that of an increasing number of aged persons. In 1944 average length of life (life expectation) was $65\frac{1}{8}$ years, almost 16 years greater than at the beginning of the century. For white females it was 68.95; for white males 63.55, a little less than the peak of 1942 as a consequence of the relatively high mortality among men in military service. Although the life expectancy of Negroes was less, their gains since the beginning of the century had been considerably larger, 22 $\frac{3}{4}$ years for males and 24 for females. The proportion of old people was increasing more rapidly in the large U.S. cities than in the country as a whole. Between 1930 and 1940 the number of people aged 65 and over in the United States increased 35%. In cities of 250,000 or more inhabitants, however, the increase was 47%. Cities with low percentages of elderly people were generally in southern states; those with the largest numbers on the Pacific coast. Two cities in New England, Boston and Providence, also showed a high proportion of older people. The fact that elderly persons are more likely to be a burden to a family in urban than in village or rural communities became a distinctive feature of American life, significantly affecting marriage and the home. Many of these aged persons could not be adequately cared for by family members without affecting both marriage and child-bearing. In the middle class especially younger family members, because of their responsibility for elderly parents, postponed or gave up the idea of marrying. There was reason to believe also that for the same reason married couples denied themselves parenthood or postponed or

limited it. Insofar as the aged were supported by public funds, the middle class received relatively less assistance from public funds and was more sensitive to the effect of increased tax burden, its adversity affecting its opportunity or willingness to reproduce. In 1946 the *Journal of Gerontology* began publication, providing a much needed periodical for the scientific discussion of the problems of aging.

During the decade 1937-46 much progress was made in premarital legislation. By 1945 32 states and the territory of Hawaii required premarital examinations and blood tests for syphilis before issuing marriage licences. Thirty five of the same states and the territory of Hawaii also required that the examining physician make a blood test for syphilis in expectant mothers. Although in 1945 there were ten states which had refused to pass laws regarding premarital examination, the tendency suggested that soon this would be a standard requirement throughout the United States. Progress also was made in acquainting those about to marry, especially the college group having had marriage courses, with the advantages of the premarriage medical examination, particularly of women. During the ten-year period there was greater recognition of the need for revising divorce laws pertaining to those suffering from long continued and apparently incurable insanity.

These laws generally required a definite duration of insanity before granting divorce and also satisfactory arrangements for the support of the insane partner during his or her life.

A significant divorce decision of the United States supreme court was that of *Williams v. North Carolina* in 1944, in which North Carolina for a second time appealed divorce decrees granted in Nevada to two of its residents who went there for the six weeks' required residence. The contention of North Carolina that the six weeks' absence from the state did not constitute a genuine residence in Nevada since it was undertaken merely to obtain a divorce with the intention of then returning to North Carolina was upheld. As a consequence, a great many similar migratory divorces had their validity thrown into doubt. In England a decision of equal legal significance was made by the British court of appeals' annulling a 13-year marriage as unconsummated on the ground that the husband insisted on using contraceptives.

Great progress was made during the decade in various movements to conserve marriage and family life. There was a large interest among professional groups, especially sociologists, social workers and physicians in activities designed to strengthen marriage and lessen divorce. On the part of the churches there was a decided lessening of emphasis on repressive measures to meet the divorce evil and more emphasis on educational efforts for the building of wholesome marriage and family life. All three of the major faiths, Catholic, Protestant and Jewish, developed various organizations to encourage education for marriage and counselling of those encountering difficulty in their marriages. Agitation among Protestants continued throughout the period for the liberalizing of church regulations concerning divorced persons. Within the Episcopal Church the group asking for a more liberal attitude gained in strength. Increasing attention was given to the training of candidates for the ministry as marriage counsellors. Among new developments was the recognition of a small group of professional marriage counsellors that they needed a national organization to establish professional ethics and standards of procedure. This led to the establishment of the American Association of Marriage Counselors in 1945.

There was a marked increase in specialized studies concerning marriage and divorce. Slight progress was made during the period in providing instruction in preparation for marriage for high school students. Here, however, greater emphasis was still on family life, with little frank discussion of marriage problems. The conviction was growing among students of the family, nevertheless, and was supported by thoughtful parents that even as far down as the elementary grades an intelligent program for the conservation of marriage should be included in the instruction, adapted to the age level of youth, as preparation for the responsibilities of marriage and parenthood. There was a marked increase in the literature dealing with marriage counselling during the last half of the decade.

Graduate instruction planned to prepare specialists as educators and counsellors in the field of marriage and the family was developed at the University of North Carolina and at Pennsylvania State college. A great many conferences dealing with marriage and family life were held in various parts of the United States. The National Conference for Family Relations grew during the period both in numbers and in influence.

(E. R. G.)

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Great Britain.—English and Scottish law recognized before 1937 the validity of polygamous marriages only as far as rights of succession to property and legitimacy were concerned. This recognition was carried further in 1939, when the house of lords recognized a Hindu polygamous marriage in which husband and wife later joined a monogamous sect as sufficiently valid to entitle the son of the union to succeed to a peerage of the United Kingdom; and further still in 1945 when a Hindu's earlier polygamous marriage was held valid and his later English wife obtained a divorce on the grounds of bigamy. In Scotland irregular or "Gretna Green" marriages by declaration before witnesses or on promise were no longer capable of being validly contracted after the coming into force of a 1939 act, the operation of which was due to start in 1940 but was postponed because of World War II.

Marriages under Scottish law were allowed in wartime in England in cases of Scottish persons in the navy, army or air force.

In 1938 important developments of the divorce law took effect. Divorces were not permitted within three years of a marriage except in special cases by leave of the court, and desertion for three years or more, cruelty and incurable insanity for at least five years became grounds on which a marriage might be dissolved at the instance of either husband or wife. A wife could also obtain a divorce on the ground that the husband had since the marriage been convicted of rape, sodomy or bestiality. Additional grounds were also added on which a court might declare a marriage void: these were nonconsummation because of the wilful refusal of either party, insanity or epileptic condition, pregnancy by another man or venereal disease, if any of these states existed at the time of the marriage and was

unknown to the party instituting nullity proceedings. A further alternative was an application for presumption of death and consequent dissolution of marriage. These new grounds greatly increased the number of divorces granted which rose steadily from 5,000 in 1937 to 10,000 in 1943, and more than 20,000 in 1946.

Wartime marriages created a problem as they were often undertaken on the spur of the moment with foreign or dominion troops and later gave rise to difficulties of nationality and domicile as well as matrimonial incompatibility. To meet these, it became law in 1944 that the English court could dissolve such marriages at any time if the wife had been domiciled in England when married and had not gone to the country to which her husband belonged; such divorces could before only have been pronounced in the country of domicile of the husband.

The final development in the extension of the ease with which marriages could be dissolved came in 1945 and 1946, when administrative action by the lord chancellor greatly increased both the number of the tribunals which dealt with divorce (by the temporary addition of special commissioners and county court judges to the divorce judges of the high court) and also the number of Poor Persons Legal Aid units (consisting of one solicitor and a staff of assistants) who prepared cases for persons of inadequate means at the public expense, which grew from 8 to 34. Another rule reduced, from Oct. 5, 1946, the six months' waiting between trial and final decree of divorce to six weeks only. The committee on Procedure in Matrimonial Causes set up by the government under the chairmanship of Justice Alfred Denning made other proposals for cheapening costs and simplifying procedure in divorce which were still under consideration at the end of 1946.

Reforms were also made in the law relating to domestic proceedings arising out of a marriage but not aimed at divorce. In such cases, usually brought to obtain orders for maintenance in the magistrates' courts, the parties had from Oct. 1937 to be heard as far as possible in private, newspaper reports were restricted to a minimum, conciliators were often appointed to bring the parties together again if possible, and the court itself was to consist of not more than three justices, including a man and a woman.

As a result of the wider grounds for divorce, the instability of many wartime marriages, the increase in the speed with which divorces might be obtained and the decrease in the costs of a divorce, a divorce came to be looked on by the end of 1946 much more as a normal incident of life than in 1937.

Europe.—During World War II countries whose governments were in exile and many of whose nationals were fighting or working abroad made special laws allowing such nationals to divorce their wives or husbands in circumstances in which divorce would previously have been unobtainable. Norway, for example, permitted the grant of divorces in England, without notification to a person in Norway being divorced, where there had been long separation. Such temporary measures lapsed after the return of these governments to their own countries.

In Germany the Hitlerite principle of racial discrimination was carried into the domestic relationship of husband and wife and divorce was freely granted on the ground simply that the party from whom a divorce was sought was of Jewish or partly Jewish extraction; such divorces were encouraged in accordance with the German theory of racial contamination by the introduction of Jewish blood. Such divorces ceased to be obtainable at the end of World War

II, but the number of divorces granted under the remaining principles of German law increased sharply from 1945.

In the U.S.S.R. the 1936 marriage and divorce code remained substantially unchanged but official disapproval by the highest political and governmental authorities of what was called "sexual hooliganism" effectively reduced the numbers of applications for divorces and helped to strengthen the marriage bond in practice, though it remained as easily severable in theory as before.

The most notable and permanent of divorce and marriage law developments occurred in Eire in 1937 when constitutional enactments pledged the support of the new sovereign state to the institution of marriage in the most definite terms and prohibited the dissolution of marriages in that country. Foreign divorces were recognized in Eire only where they were valid under the law of the country of domicile of the parties; and neither party to such a dissolved marriage could remarry within the Eirean jurisdiction during the lifetime of the former spouse. Foreign decrees of nullity were not generally recognized. In Eire itself nullity of marriage and decrees of judicial separation could still be pronounced but there could be no divorce. This change, at first sight startling, was a natural consequence of the Roman Catholic religious background of the newest European sovereign state. (See also BIRTH STATISTICS; CENSUS DATA, U.S.; CHILD WELFARE; CRIME; DEATH STATISTICS; INFANT MORTALITY; LAW.)

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Marshall, George Catlett

Marshall (1880–), U.S. army officer, was born at Uniontown, Pa., on Dec. 31, 1880. Commissioned second lieutenant of infantry in Feb. 1901, after completing his studies at Virginia Military institute, Lexington, Va., and at the Army Staff college, he advanced through the grades to brigadier general in 1936. He was with the U.S. expeditionary forces in France in 1917 as chief of operations of the 1st army and as chief of staff of the 8th army corps. After the war he served as aide-de-camp to Gen. John J. Pershing for five years. From 1924 to 1927 he was stationed in China. He was appointed commander of the 8th infantry in 1933.

On Sept. 1, 1939, the day Adolf Hitler invaded Poland, Marshall was made chief of staff and was promoted to the rank of full general. An advocate of aid to Britain and of military conscription, he directed and co-ordinated the enormous task of building up the U.S. army after enactment of the Selective Service bill. During World War II he attended the major international Allied conferences, including those of Casablanca, Cairo and Tehran, and conferred with military officers on all the fighting fronts. Marshall was promoted, in Dec. 1944, to the new five-star rank of general of the army.

In the inquiry report of Aug. 29, 1945, assigning responsibility for U.S. unpreparedness at Pearl Harbor, Gen. Marshall was charged with "failure in his relations with the Hawaiian department," but Pres. Harry Truman and Secretary of War Stimson defended Marshall's leadership. In Nov. 1945 Marshall relinquished his post as chief of staff to Gen. Dwight D. Eisenhower. Later that month he was named ambassador to China, replacing Major

Gen. Patrick Hurley. In Chungking Marshall succeeded in effecting a temporary truce in the civil war between Chungking nationalists and the Chinese communists. Granted the permanent rank of general for life, Marshall was appointed a member of the national defense council in March 1946.

On Jan. 7, 1947, he was appointed U.S. secretary of state, succeeding James F. Byrnes.

Marshall Islands

The Marshall Islands, largely atolls, were of little value and little concern to the civilized nations of the world till World War II began shaping up in the 1930s, at which time their military value became a consideration. Holding the islands under a League of Nations mandate, Japan closed them to the world and secretly began fortifying them in the middle 1930s. Military security was so tight that when the Allies found themselves at war, they had little information about the strength and nature of the island fortifications.

The archipelago, forming the southeast extremity of a 2,500-mi. island barrier, aided Japan in harassing United States shipping to Australia and in cutting it off from the beleaguered Philippines. It also furnished "anchored aeroplane carriers" and submarine bases, from which Japanese forces could operate to discourage attack. Eniwetok and Kwajalein were especially useful to the Japanese, furnishing air bases and vast reef-protected anchorages for vessels of all sizes.

When Eniwetok and Kwajalein were taken by U.S. task forces in Feb. and March 1944 they were put to use as staging and repair bases for operations against the Marianas and subsequent campaigns. Kwajalein became one of the principal stops for air travel between Hawaii and all points in the Southwest Pacific and the far east.

Bikini atoll, being somewhat isolated, was chosen by the U.S. navy as the site for testing two atomic bombs, in an operation known as "Crossroads," in July and early Aug. 1946. In each test a fleet of ships of various classes was left at anchor, without crews, in Bikini lagoon, and subjected to the effect of an atomic bomb, the first bomb being detonated above water, the second under the surface. Several ships were sunk in each test. On Aug. 16, Vice-Admiral W. H. P. Blandy, chief of Operation Crossroads, announced he was moving his testing base to Kwaja-

lein because of "persistent radioactivity." Preceding the tests the natives, 164 in number, were moved to Rongerik atoll, where seabees helped them build new huts in a well-designed village. The displaced islanders also were given several life rafts and their outrigger canoes, used in fishing, were moved for them to the new location. Seabees also built them a church and a meeting house. These islanders told of the departure from Bikini of missionaries, whom they called "Bostons," in 1940, when the Japanese began converting Bikini into a rehabilitation centre for convalescent troops.

Postwar government of the Marshalls was under direction of a senior U.S. naval officer with a staff of specially trained U.S. administrators. Objectives of the administration were to provide education, training in sanitation and health, medical services, to reconstruct war damaged property, to establish self-governing communities, to develop gardening where soil permitted, and generally to assist natives in becoming economically independent.

The native population of the islands, estimated at 15,000 in 1885, had dropped to about 5,000 under the Japanese, who brought in several thousand of their own civilians in addition to military personnel. Japanese military and civilian populations were largely removed after the Marshalls were fully occupied following Japan's surrender.

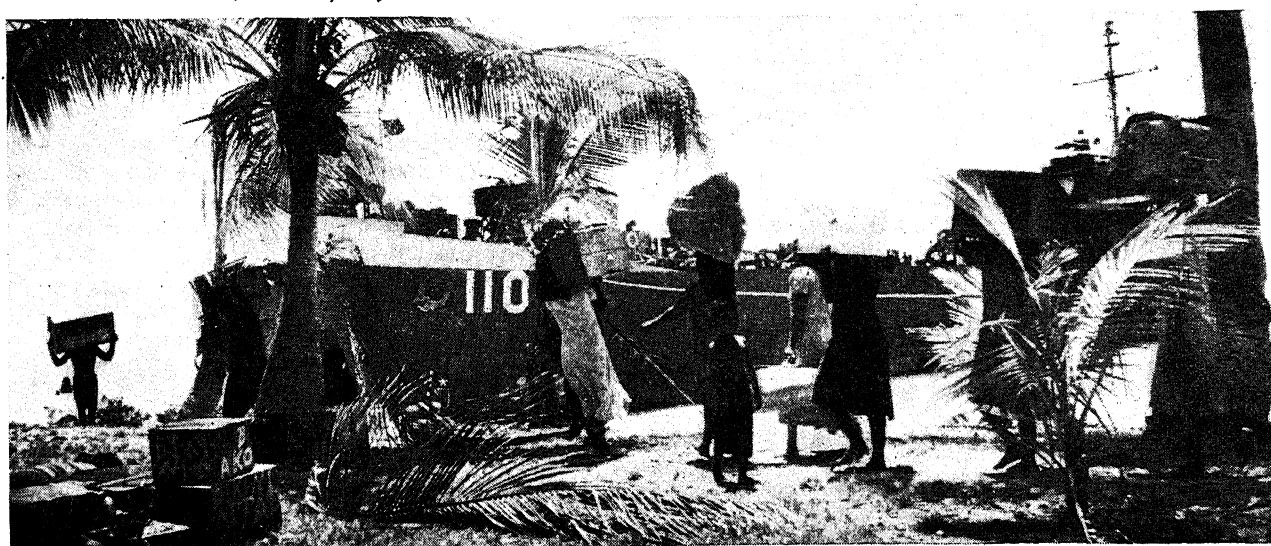
The Japanese-mandated Marshalls were placed under U.S. strategic trusteeship by unanimous vote of the United Nations security council on April 2, 1947. (See also PACIFIC ISLANDS, MANDATED.)

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Martin, Joseph W., Jr.

Martin (1884-), U.S. legislator, was born at North Attleboro, Mass., on Nov. 3, 1884, the eldest son in a blacksmith's family of eight children. After graduation from high school he became a reporter for the *Attleboro Sun* and the *Providence Journal*. In 1908 he became publisher of the North Attleboro *Evening Chronicle*, and four years later he was a member of the Massachusetts

Natives of Bikini atoll in the Marshall Islands being evacuated by LST to Rongerik atoll on March 11, 1946, in preparation for "Operation Crossroads," the army-navy atom bomb tests



house of representatives. From 1922 to 1925 he served as executive secretary of the Republican state committee. Elected to the U.S. house of representatives first in 1925, Martin became well known as a shrewd parliamentarian and political strategist. After being named Republican leader of the house in 1939, he solidified the minority party into a formidable opposition to the New Deal. Wendell Willkie selected Martin as chairman of the Republican national committee in July 1940 to succeed John D. M. Hamilton. Martin resigned the chairmanship after the elections of Nov. 1942. Continuing as minority leader in the house, he was chosen chairman of the Republican national convention in April 1944.

Martinique

See FRENCH COLONIAL EMPIRE.

Maryland

A south Atlantic state, Maryland is one of the original 13 states, popularly called the "Old Line state." Area 10,577 sq.mi., of which 9,887 sq.mi. are land. Pop. (1940) 1,821,244: urban 1,080,351 or 59.3%; rural 740,893 or 40.7%; white 1,518,481; nonwhite 302,763; foreign-born 81,715. On July 1, 1944, the bureau of census est. the civilian pop. of the state at 2,127,874. Capital, Annapolis (pop. 1940, 13,069); other cities: Baltimore (859,100), Cumberland (39,483), Hagerstown (32,491), Frederick (15,802).

State officials at the beginning of the decade 1937-46 were: governor, Harry Whinna Nice (Rep.); comptroller, William S. Gordy, Jr. (Dem.); attorney general, Herbert R. O'Connor (Dem.).

The 1938 session of the legislature passed Maryland's first income tax law (one-half of one percent on all incomes with the same exemptions, generally, as provided by federal law); strengthened the University of Maryland; added to the powers and area of the Washington Metropolitan District commission in order to provide for growth of Washington suburbs; provided for state use of prison-made goods; incorporated the town of Greenbelt, Prince George's county, a \$15,000,000 federal housing project; authorized the creation of housing authorities with condemnation powers by incorporated cities; and provided for a new state office building at Annapolis.

Sen. Millard E. Tydings, in the interest of whose defeat Pres. Roosevelt "invaded" the state in 1938, easily won the Democratic nomination in the primary and was re-elected in the general election by a record majority vote for state-wide offices. Attorney general Herbert R. O'Connor (Dem.) defeated Gov. Harry W. Nice, who stood for re-election on the Republican ticket. Other officials elected were J. Millard Tawes (Dem.), attorney general, William C. Walsh (Dem.) comptroller. Proposed constitutional amendments authorizing lotteries, and a graduated income tax, were defeated at the polls. With the purpose of ending the activities of the "marrying parsons" at Elkton, the state's Gretna Green, an act of the legislature requiring a 48-hour wait between the application for licence and the performance of the ceremony was approved.

In the 1939 legislative session, important laws passed included two which provided for the creation of separate conservation commissions; one to regulate oyster culture and the oyster industry; the other to regulate propagation, protection, etc. of wild fowl, game and "inland" fish. The state welfare department was reorganized. The old county and district coroner system was replaced by

a department of post-mortem examiners headed by an unpaid commission. A legislative council was created to collect information concerning the state government, supervise the interim work of committees and prepare a legislative program in the form of recommendations for the next session. The new state office building in Annapolis designed to house all state offices was completed and occupied. (Ed. EL.; X.)

In the 1940 presidential election, Roosevelt received 385,546 votes and Willkie 269,544; the Socialist party 3,967, Communist 1,216. Seven constitutional amendments and two state referenda were voted on in November. Four amendments and one referendum were approved. They provided for a people's court in Baltimore city and counties and an additional circuit judge; salaries of judges and public officers were declared not exempt from income taxes. A legislative act changing the state Industrial Accident commission was approved by referendum, and reorganization was announced.

The 1941 biennial session of the legislature met from Jan. to April; 1,481 measures were introduced and 937 were passed, of which 82 were vetoed by the governor. The new legislative council established in 1939 held hearings, issued research reports on proposed legislation and made its first report to the legislature. Of 118 bills sponsored by the council, 99 were enacted into law. These included bills placing a state-wide ban on fireworks, regulating instalment selling, providing for roadside control and changing publication notices for constitutional amendments. Thirty obsolete or duplicate laws were repealed on recommendation of the council. A law was passed providing for a board of natural resources to co-ordinate activities of several state departments concerned with conservation, and the board was organized by the governor. The unemployment insurance law was modified, and numerous tax and motor control laws were passed. The Woman Suffrage amendment was belatedly ratified.

Governor O'Connor was re-elected in 1942 for a second term by a narrow margin; the total vote cast was 333,136, as compared with 486,472 in 1938. The Democrats lost two of the six house of representatives seats. Seven constitutional amendments were voted on at the November election and four were approved. The most important were: (1) authority for the legislature to standardize fees for clerks of courts and registers of wills; (2) provision that the state roads commission condemn and immediately take property needed for highway purposes subject to court review; (3) provision for additional compensation for members of the general assembly (increased pay from \$5 per diem to \$1,000 per year). The amendments voted down related to juvenile court jurisdiction, publication of proposed constitutional amendments and establishment of regulations for bequests to churches.

The legislature met for its biennial session, Jan. to April 1943. Important bills passed included a constitutional amendment reorganizing the court of appeals—as recommended by a committee report. The juvenile court of Baltimore was reconstituted so that all juvenile delinquents would be dealt with in the department of welfare. Provision was made for construction of two chronic disease hospitals. The conservation program was strengthened by a bill providing for a co-operative crab-conservation program with Virginia. A report by a special committee led to legislative scrutiny of the budget and a revised budget estimate by the governor. Another bill gave a bonus to school teachers and state employees and an emergency measure reduced the income tax 33% for 1942 and 50% for the 1943 tax. (C. B. S.; X.)

A special session of the legislature in 1944 provided for absentee voting of members of the armed services. At the general election of Nov. 7, 1944, the popular vote was 315,490 for Roosevelt, 292,949 for Dewey. Millard E. Tydings, Democrat, was re-elected to the U.S. senate. At the same election voters ratified proposed amendments to the constitution relating to: the reorganization of the court of appeals; the assignment of judges of circuit courts and other judges by the court of appeals; the compensation of the state's attorney; the creation of the Baltimore Redevelopment commission; the advertisement of proposed amendments to the state constitution. A proposed amendment repealing article 38 of the state declaration of rights was rejected. The article prohibited transfers of property to religious bodies or their officers without approval of the general assembly.

The regular biennial session of the legislature held in March 1945 passed a motor vehicle financial responsibility act designed to encourage motorists to ensure against accident liability.

William Preston Lane, Jr., Democrat, was elected governor in 1946 for a four-year term, to begin on Jan. 8, 1947.

Maryland: Statistical Data
Table I.—Education (Public)

	1938	1940	1941	1942	1943	1944	1945
Elementary pupils	232,423	297,031	206,124	205,016	210,792	210,162	
High school pupils	61,263		92,973	75,550	85,775	86,008	
Elementary teachers	5,581	8,884	5,363	5,290	5,372	5,561	
High school teachers	2,984			3,925	3,420	3,482	

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1942	1943	1944	1945
Recipients of old-age pensions	17,337	18,516	17,942	16,455*	13,461	12,396	11,556
Cost of old-age pensions	\$304	\$327	\$320				
Dependent children receiving aid	20,824	19,739	17,740	9,097*	8,919	8,013	
Blind receiving aid	625	683	671	611*	477	459	438
Workers under unemployment compensation	346,672	381,400					

*1st 11 months.

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1941	1942	1943	1944
Highway mileage		4,103	4,287	4,226	4,315	4,362	4,419
Expenditure on highways	\$17,661	\$17,956	\$18,852	\$16,696	\$24,307	\$11,315	\$12,214
Railroad mileage	1,409	1,388	1,374		1,367	1,361	1,368

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1941	1942	1943	1945
State revenue	\$48,779	\$61,159	\$67,251	\$78,493		
State expenditure	\$37,565	\$42,573	\$63,572	\$54,134	\$45,367	\$73,483
Number of national banks	63	63	63	63	63	63
Deposits of national banks	\$296,544	\$387,285	\$461,497	\$447,953	\$581,861	\$785,527

Table V.—Agriculture
(Money figures in thousands of dollars)

	1937	1939	1940	1942	1944	1945
Value of crops	\$45,959	\$43,948	\$45,246	\$43,731	\$104,124	\$87,559
Leading crops (bu.)						
Barley	1,188	2,160	2,172	2,365	2,174	1,918
Corn	18,576	18,216	17,535	16,344	17,150	16,872
Potatoes	3,480	2,375	2,898	2,019	1,824	2,108
Tobacco (lb.)	22,750	32,800	31,920	31,008	32,160	21,600
Wheat	9,044	7,352	7,566	5,986	8,906	6,864

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1944	1945
Wage earners		21,052	20,392	217,345
Wages paid		\$22,992	\$21,960	174,353
Value of products		\$124,384	\$114,754	

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940	1941
Value of mineral production	10,635	9,408	11,838	12,606	17,292
Coal	3,315	2,705	2,995	3,171	4,088
Clay	1,439	1,297	1,834	1,856	2,042
Stone	1,140	1,168	1,328	1,395	2,218

Ex-Governor O'Connor, Democrat, was elected to the U.S. senate in 1946, succeeding George L. Radcliffe, Democrat.
(E. GN.; X.)

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Masaryk, Thomas Garrigue

Masaryk (1850-1937). Czechoslovak statesman, philosopher and sociologist, was born in the Moravian border town of Hodonin, March 7, 1850. Son of a coachman, he studied philosophy at the Universities of Vienna and Leipzig and at the latter met his future wife, an American. For several years his time was devoted to producing philosophical treatises, but he was elected to the Austrian *reichsrat* in 1891 and became a political leader. World War I provided an opportunity to publicize the cause of the Czechs on an international scale. This work was climaxed in 1918 when Czechoslovakia was declared an independent nation. Local recognition of his services came with successive elections as president until his resignation in Dec. 1935. Despite many political disagreements among the Czechs, he remained a subject of national reverence until his death near Prague, Sept. 14, 1937.

Masella, Benedetto Aloisi

Cardinal Masella (? -), titular archbishop of Cesarea of Mauritania and apostolic nuncio to Brazil, was born at Pontecorvo, Italy, and entered the diplomatic service of the holy see as a young priest. Although of Italian birth, Archbishop Masella was better known outside his native country, having spent 35 years of his priestly career in other lands. He served as chargé d'affaires to the Lisbon nunciature from 1910 to 1919, and as nuncio to Chile from 1919 to 1927, when he was named apostolic nuncio to Brazil. Archbishop Masella was proclaimed a cardinal by Pius XII at the consistory of Feb. 18, 1946.

Masonic Fraternity

See SOCIETIES AND ASSOCIATIONS.

Massachusetts

A north Atlantic state of the United States, Massachusetts was admitted to the union Feb. 6, 1788, popularly known as the "bay state." Area 8,257 sq.mi., including 350 sq.mi. of inland water. Population (1940) 4,316,721, of which 3,859,476 was urban, 457,245 rural; 4,257,596 white, 55,991 Negro. In 1945 the population was estimated at 4,493,281. Capital, Boston (770,816). Other principal cities are Worcester (193,694); Springfield (149,554); Fall River (115,428); Cambridge (110,879); New Bedford (110,341); Somerville (102,177); Lowell (101,389); and Lynn (98,123).

For the third successive biennium the government of Massachusetts was entrusted to an executive department predominantly Democratic and a legislative department decisively Republican in 1937. Inaugurated on Jan. 6, 1937, for a two-year term were the following elective officers: governor, Charles F. Hurley (Dem.); lieutenant governor, Francis E. Kelly (Dem.); secretary, Frederic W. Cook (Rep.); treasurer, William E. Hurley (Rep.); attorney general, Paul A. Dever (Dem.); auditor, T. H. Buckley (Dem.).

During the 1937 legislative session more than 2,500 petitions were considered and several important bills were

enacted. It was voted to submit to popular referendum the question of biennial instead of annual sessions of the legislature. The people approved biennial sessions. By another act a state pension system for judges was established. The legislature also ratified interstate flood compacts for the Merrimac and Connecticut valleys, created a commission to study communist, fascist and nazi activities within the state, voted to permit absentee voting in town elections and abolished the law providing for pre-primary conventions of the major political parties. A move to abolish capital punishment was defeated, as were bills to legalize a state lottery, to tax chain stores, to impose a 2% sales tax, to ratify the national child labour amendment and to bar married women from civil service positions.

The 1938 legislative session established a new record for length of session, meeting from Jan. 5 to Aug. 24. During the session, 498 acts and 91 resolves were passed and approved by the governor. Among them were bills allowing voters in each county to decide whether betting on horse and dog racing should be continued for the next four years; abolishing breach of promise suits; amending the Boston charter so that the mayor might become immediately a candidate to succeed himself; reducing from 4½ to 4% the rate of interest on unpaid local taxes; extending the term of the police commissioner of Boston from five to seven years; protecting motorists against misleading signs relating to the price of motor fuels; reorganizing the state department of mental diseases; recodifying Boston building laws; revising state securities laws so as to bring oil royalties under the supervision of the Public Utilities commission.

In the hurricane and flood of Sept. 21, 1938, 45,000 Massachusetts families suffered losses in varying degree. The number of persons lost or dead was 187; those suffering injuries totalled 462; 445 permanent homes and 2,767 summer homes were destroyed in addition to 847 barns and 2,943 out-buildings. The number of families needing Red Cross assistance was 6,094. It was estimated that \$650,000 worth of fishing boats, equipment, docks and shore plants were destroyed, and the loss to farmers of the state \$13,096,000. Trees blown down aggregated 1,000,000-000 board feet of lumber, valued at \$17,000,000.

(H. T. C.; X.)

The Republicans, led by Governor Leverett Saltonstall, completed in 1939 their first year in control of the executive department after six years of Democratic rule. Inaugurated in Jan. 1939, for a two-year term, were the following elective officers in addition to Saltonstall: lieutenant governor, Horace T. Cahill (Rep.); secretary, Frederic W. Cook (Rep.); treasurer, William E. Hurley (Rep.); attorney general, Paul D. Dever (Dem.); auditor, Russell A. Wood (Rep.).

The 1939 legislative session convened on Jan. 4 and was prorogued on Aug. 12. During the session 517 acts and 74 resolves which had passed the legislature received also the approval of the governor. Twenty-two acts and one resolve were returned by the governor without his approval. The principal battle of the session was over the taxation program proposed by the governor, a large portion of which finally passed. The governor also succeeded in reorganizing several state departments through removals, forced resignations and legislation.

In the 1940 presidential election Roosevelt secured 1,076,522 votes; Willkie 939,700; Thomas (Soc.) 4,091; Browder (Com.) 3,806; Aiken (Soc. Labor) 1,492; Babson (Prohibitionist) 1,370. Governor Saltonstall was also re-elected. No

session of the legislature was held in 1940, under the biennial plan adopted in 1939.

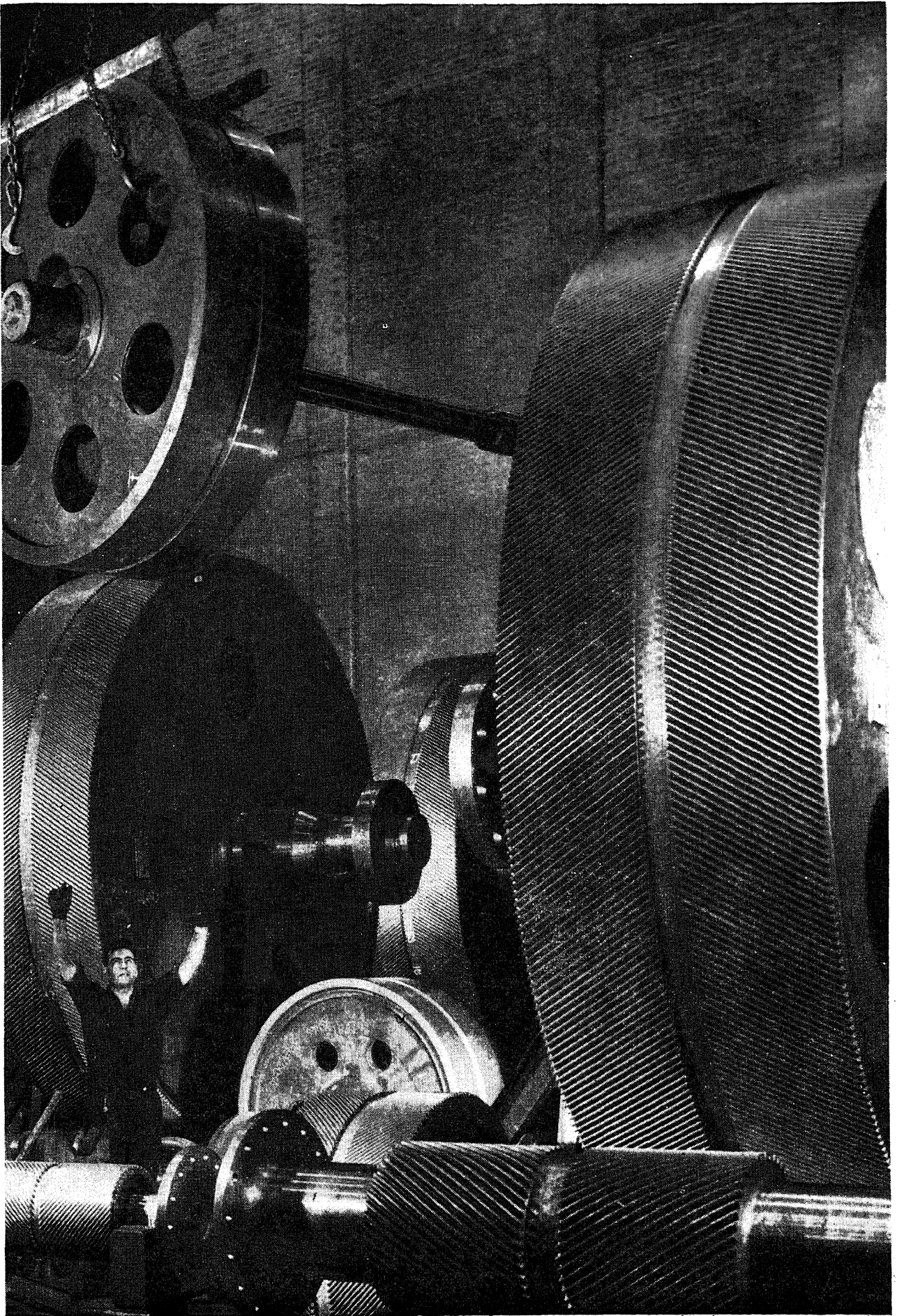
Reporting on his first two years of administration, ending Dec. 31, 1940, Governor Saltonstall noted that 215 of the 351 cities and towns had reduced their tax rates in 1940. The two years, 1939 and 1940, brought a total of 681 new industrial concerns and concerns requiring substantial expansion. The state debt during the two years was cut \$19,000,000, nearly one-half, the largest reduction in 40 years. Flood control work was completed by the state on 600 mi. of streams in addition to flood control work by the federal government. The state ranked among the five leading states in war production and had one of the largest national guards of any state in proportion to population. At the 281 vocational schools in the state more than 50,000 people were receiving training, much of which was directed to the needs of the defense program.

In 1941 the legislature was in session for 171 days, the longest session in its history. Legislation for defense and war constituted most of the action. The net state assessment on municipalities for 1941-42 was the lowest since World War I, with the exception of 1931-32. The net direct debt of the commonwealth between 1938 and 1941 was cut down from about \$40,700,000 to \$15,937,000. When the state national guard was taken into army service, a new state guard of 6,000 was organized, equipped, trained and ready for home police duty by the end of 1941. One of the most productive acts of the governor was the formation of the Massachusetts Industrial Committee for National Defense. Civilian organization for home protection and regulation of consumption was rapidly completed under the direction of the committee on public safety.

In the Nov. 1942 election Governor Saltonstall was elected for his third two-year term and the Republican party again won most of the elective state offices. State officers included Horace T. Cahill, lieutenant governor; Frederic W. Cook, secretary of state; treasurer and receiver general, Francis X. Hurley; Thomas J. Buckley, auditor; Robert T. Bushnell, attorney general. In January Governor Saltonstall proclaimed a state of emergency and assumed the full powers provided by law, this action being ratified and continued by a special session of the legislature. Massachusetts was the first state in the union to begin active civilian defense preparations through the establishment of a state Committee on Public Safety. Closely related to the work of this committee was the state plan for handling any emergency through co-operation of all military and nonmilitary state agencies. Through the Military Information centre in the state house, the Disaster Relief commission was on a 24-hour-a-day basis in 1942.

During the 1943 session of the legislature the senate consisted of 26 Republicans and 13 Democrats, and the house of 139 Republicans and 97 Democrats. Legislation was largely concerned with provisions to facilitate the eventual postwar adjustment. Five special commissions, requested by the governor, were directly employed in preparation for the problems of reconversion. The Post-War Readjustment committee worked with private industries in their postwar planning. The Commission on Emergency Public Works assembled and evaluated plans for public works by the state and stimulated cities and towns to plan projects. The Post-War Highway commission studied the order of priority for projected new highways.

Turbine gears for U.S. warships of World War II, manufactured at the General Electric plant in Lynn, a leading industrial centre of Massachusetts



A committee on transportation studied the revamping of the Boston transportation system. The committee on veterans' rehabilitation and re-employment was charged with the task of assisting returning veterans. The legislature also set up a commission as a liaison agent between the executive and legislative branches in dealing with the problems of returning veterans. The net direct debt of the state government by Nov. 30, 1943, was further reduced to \$5,663,861, and the combined debt of the state's cities and towns was less than \$215,000,000, a drop of more than \$100,000,000 from the 1932 peak.

In April 1944 Governor Saltonstall called a special session of the legislature to pass legislation necessary for the servicemen's ballot. In the state election of November the following officers were elected: governor, Maurice J. Tobin (Dem.); lieutenant governor, Robert F. Bradford (Rep.); secretary of state, Frederic W. Cook (Rep.); attorney general, Clarence A. Barnes (Rep.); treasurer, John E. Hurley (Dem.); auditor, Thomas J. Buckley (Dem.); senator, Leverett Saltonstall (Rep.). Governor Saltonstall was elected U.S. senator by a plurality of 561,668, the largest given any state candidate after Calvin Coolidge. In the presidential election Franklin D. Roosevelt polled a plurality of 113,946 votes.

Constitutional amendments in 1944 restored the practice of holding annual sessions of the legislature, empowered the legislature to prescribe terms and conditions under which felons might be pardoned by the governor and council, provided for simplification of description of measures presented for referendum and provided for absentee voting by qualified voters physically disabled. The financial position of both state and municipal governments was exceptionally good. Even with the new bond issue of \$1,250,000 early in 1944 for airport development, the net direct debt on June 30, 1944, was only \$6,541,615. The combined debt of cities and towns at the close of the year was approximately \$189,000,000. (L. SL.; X.)

The 1945 session of the legislature voted to pay the state's more than 500,000 veterans of World War II a \$100 cash bonus; voted \$15,000,000 for expansion of Logan International airport at East Boston; voted \$15,000,000 for development of the port of Boston and authorized establishment of a new port authority with sweeping powers. The legislature also approved a six-year highway program which was to cost approximately \$153,000,000.

The net direct debt of the state on July 1, 1945, was \$4,593,775 and the combined debt of the cities and towns at the close of the 1944-45 fiscal year was \$170,000,000.

During the legislative session of 1946, several notable

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1943	1945
Highway mileage . . .		1,878	1,888	6,077	6,077	6,516
Expenditure on highways	\$37,416	\$34,695	\$44,889	\$10,903	\$9,151	
Railroad mileage . . .	1,923	1,857	1,792	3,883	4,200	4,200

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1944
State revenue . . .	\$145,332	\$158,083	\$163,970	\$132,624	\$125,588
State expenditure	\$98,617	\$139,112	\$142,266	\$125,412	\$126,068
Total bank deposits	\$3,979,700	\$3,977,500	\$4,344,900	\$5,216,255	\$6,971,838
Number of national banks	127	126	125	124	124

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1941	1943	1945
Income from crops and livestock	\$76,200	\$75,690	\$75,690	\$75,609	\$153,903	
Leading crops (bu.)						
Apples	2,598	2,829	2,174	2,174	2,228	
Asparagus (crates) .	181	166	166	156	149	
Corn	1,640	1,520	1,558			1,634
Cranberries (100 lb.)	565	490	325	510	485	470
Hay (tons)	584	504	586	450	568	588
Onions	639	378	434	411	258	
Potatoes	2,254	2,635	3,135	2,492	3,375	2,788
Tobacco (lb.)	8,262	9,899	9,835	10,031	8,258	8,460

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1935	1937	1939	1940	1943
Wage earners . . .	442,649	496,036	460,674	492,675	711,727
Wages paid	\$445,831	\$556,077	\$500,923	\$586,441	\$1,473,664
Value of products	\$2,095,390	\$2,620,789	\$2,459,771	\$2,753,147	\$6,249,656

Table VII.—Mineral Products
(All figures in thousands of dollars)

	1937	1938	1939
Value mineral production	\$7,813	\$6,666	\$8,180
Stone	4,408	3,865	4,460
Sand and gravel	1,421	1,228	1,719
Lime	897	742	1,005
Clay	822	635	866

measures were adopted, including the establishment of a Fair Employment Practice commission to prevent discrimination against workers.

In Nov. 1946 the following were elected to state offices: governor, Richard F. Bradford (Rep.); lieutenant governor, Arthur W. Coolidge (Rep.); secretary of state, Frederic W. Cook (Rep.); attorney-general, Clarence Barnes (Rep.); state treasurer, Laurence M. Curtis (Rep.); auditor, Thomas J. Buckley (Dem.). (M. J. To.)

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Materials Co-ordinating Committee (U.S. and Canada)

See CANADIAN-U.S. WAR COMMITTEES.

Maternal Mortality

See DEATH STATISTICS.

Mathematics

The development of mathematics, in common with that of most other subjects during the period 1937-46, was to a large extent dominated by World War II. The volume of mathematical publications was sharply reduced after 1939. Many mathematicians were engaged in non-mathematical work, or in mathematics directly needed for war research. There was increased interest in problems of applied mathematics. However, in most countries progress continued to be achieved in pure mathematics as well, even during the war. The tendencies of the preceding few years continued. More and more, fields which had formerly

Massachusetts: Statistical Data

Table I.—Education (Public)

	1938	1941	1942	1943	1944	1945
Elementary pupils . .	516,940	399,716	367,435	358,459	348,562	
High school pupils . .	227,931	284,796	212,959	232,586	219,727	215,604
Elementary teachers .	14,633	14,145	13,974	13,713	13,549	13,446
High school teachers .	10,519	11,104	11,052	10,764	10,523	10,380

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1939	1940	1941	1944	1945
Number of cases on general relief . . .	66,318	63,172	64,079	36,732	14,942	12,683
Cost of general relief	\$1,958	\$1,660	\$1,605	\$869		
Recipients of old-age pensions	74,902		85,186	87,067	78,525	75,406
Cost of old-age pensions	\$2,139		\$2,445	\$2,518		
Dependent children receiving aid . . .	22,900		30,486	31,234	18,493	17,448
Blind receiving aid .	1,097		1,183	1,175	961	949
Workers under unemployment compensation	927,882	1,012,522	1,064,500			

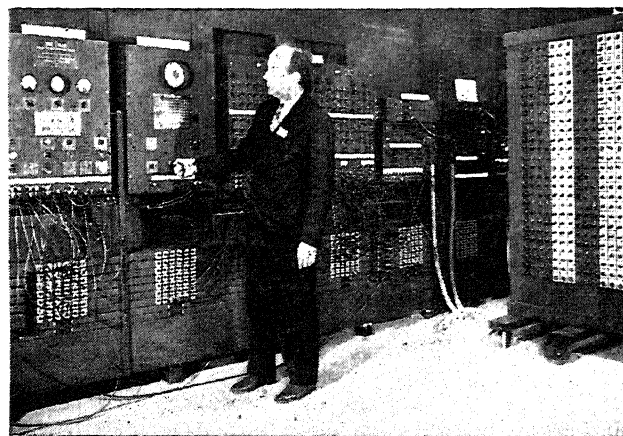
been regarded as quite distinct began to run together, to borrow one another's ideas and methods, until it was often difficult to decide to what field a given publication could properly be said to belong. Another aspect of the same tendency was increased generalization and abstraction. Particularly in the fields of algebra, geometry and topology, and analysis, this tendency led to much experimentation and irregular growth; it was hard to name, year by year, the most outstanding individual contributions, but at the end of a few years it could be seen that significant progress had been made.

Little mention needs to be made of individual countries; except for physical difficulties, the tendencies were much the same in each. This is well exemplified by the case of Japan, which had no mathematical contact with the English-speaking countries from the end of 1941 until 1946. When Japanese mathematical publications for the war years reached the U.S. in 1946, it was found that a number of important results had been reached independently by workers in both countries. The only important mathematical school which ceased work completely was that of Poland, where some half of the prominent mathematicians lost their lives and no work was done until late in 1945. Restoration of normal communications showed that much more mathematics than had been anticipated was accomplished in the other occupied countries of Europe. Germany had been, until 1933, one of the two or three leading mathematical centres; but by 1941 there were more prominent German mathematicians in other countries, particularly the U.S., than in Germany; German mathematics suffered a corresponding decline.

Mathematical congresses inevitably decreased in number. The International Mathematical congress, scheduled for 1940, was postponed indefinitely. The Fifth International Congress for Applied Mechanics was held in 1938 in Cambridge, Mass.; the sixth, in the autumn of 1946 in Paris, was the first postwar international mathematical congress of any size. A number of important local congresses were held before 1940, notably the semi-centennial celebration of the American Mathematical society (N.Y., 1938). A few others, of more limited scope, took place even during the war. The first Canadian Mathematical congress was held in 1945.

Foundations.—One of the most striking results of recent times in the foundations of mathematics was obtained in 1938 by a former Austrian, working in the U.S. The status of the two propositions known as the axiom of choice and the continuum hypothesis had been in doubt for many years. One form of the former states that if we have a collection (in general, infinite) of different sets of objects, we can form a new set containing exactly one object from each set. This axiom appeared to be essential for many mathematical results, but its use was viewed with suspicion by many mathematicians. Even by using the axiom of choice, it was not possible to establish the continuum hypothesis, a statement, too technical to describe here, about the cardinal number of the set of all real numbers. The new discovery was that, if the other axioms of the theory of sets are consistent, then they remain consistent if the axiom of choice and a generalized continuum hypothesis are added. Thus, unless set theory itself is self-contradictory, the axiom of choice and the continuum hypothesis, if not derivable from the other axioms, can be added without doing any harm (a situation analogous to the "parallel postulate" of Euclidean geometry).

Number Theory.—Noteworthy progress was made in some of the oldest problems of the subject. In 1742 Christian Goldbach conjectured that every even number



Dr. J. P. Eckert, Jr., co-inventor of the electronic numerical integrator and computer, first revealed by the U.S. war department in 1946. The machine was expected to revolutionize modern engineering by its great speed in solving mathematical problems

(greater than 2) can be represented as a sum of two primes. No progress was made until it was proved in the early 1930s that every integer can be represented as the sum of not more than a certain (large) number of primes. In 1937 a Russian proved that every sufficiently large odd number is the sum of three primes (so that every sufficiently large even number is the sum of at most four primes).

Waring's problem, dating from 1770, is the problem of finding a number $g(k)$ such that every positive integer is the sum of $g(k)$ k th powers. While the existence of a $g(k)$ was proved by David Hilbert in 1909, it was only in the period under review (1937–46) that a complete solution was obtained for most values of k ; only the values 4, 5 and 6 were still in doubt. Except when $k=2$, only the smaller numbers require the full number of k th powers; let $G(k)$ denote the numbers which suffice to represent all sufficiently large integers. Considerable progress was made in improving previous estimates for $G(k)$. In one of the most difficult cases, $k=3$, a Russian proved that $G(k)$ is at most 7 (while $g(k)=9$). The study of Waring's problem was particularly active in the U.S., the U.S.S.R., Great Britain, China and India.

In a typical problem in "geometry of numbers" a plane is covered by a network of congruent parallelograms, and one asks, for a given geometrical figure K , what is the maximum area of a parallelogram such that K necessarily contains at least two vertices of the network. Results of this kind have many applications. The subject received many significant contributions, particularly in Great Britain, where new methods were developed which for the first time allowed nonconvex figures K to be considered.

A problem on the density of the sum of two sequences of integers, after defying repeated attacks for ten years, was solved in 1942 (U.S.). A proof of a generalized "Riemann hypothesis" and novel work on class fields (France) showed the power of modern algebraic concepts and methods in problems of algebraic number theory. Progress was also made in the theory of partitions of integers and in connection with Fermat's last theorem (U.S.).

Algebra.—In the rapidly developing field of abstract algebra, cultivated especially in the U.S., the U.S.S.R. and Japan, many new concepts were developed and applied to other fields as well as in the subject itself. There were important developments in the theory of partially ordered sets and lattices, which were found to have applications in such diverse fields as logic, group theory and operators in abstract spaces. Both finite and continuous groups were extensively studied. Much of classical analysis was found

to extend to functions defined on a wide class of continuous groups (work initiated in France and the U.S.S.R.). Several generalizations of the concept of a group were introduced and investigated.

Topology.—Topology is basically the study of those geometrical properties which are preserved by one-to-one continuous transformations. It has two principal subdivisions, the topology of sets of points and combinatorial topology, each of which has its own distinctive methods. In both branches, many deep results were established, but the most significant of them are too technical to be described here. Point set topology was especially cultivated in Poland (up to 1939) and the U.S.; combinatorial topology (during the period under review) in the U.S., the U.S.S.R., the Netherlands and Switzerland. The concepts of combinatorial topology, originally developed for Euclidean spaces, were found to be capable of extension to much more general abstract spaces. Important relations between topology and the theory of groups were developed. Topological methods were also increasingly being applied in problems of analysis and differential geometry. The attention attracted by topology and algebra was indicated by the fact that of the ten annual colloquium lectures of the American Mathematical society in 1937–46, five were on topics in topology and three in algebra.

Geometry.—Classical differential geometry and the differential geometry of generalized spaces continued to be studied extensively, particularly in Europe. As noted above, modern topological methods began to show their utility in this subject. Important developments took place in algebraic geometry, where the use of modern algebraic methods (particularly in the U.S.) for the first time put some of the principal general results on a secure logical basis.

Analysis.—In the theory of functions of real variables, much work was done, particularly in the U.S., on the difficult problems connected with the area of a curved surface. A curve or a surface can be looked at as an entity defined either analytically or geometrically; for curves, the two concepts lead to equivalent definitions of length, while for surfaces the corresponding definitions of area are radically different. By 1946 the theory of the area of an analytically defined surface had reached a rather satisfactory state, while that of a geometrically defined surface was still quite unsatisfactory. The problem was attracting much attention in 1946.

In the calculus of variations, progress was made in the theory of the problem of Plateau, and the so-called inverse problem of the calculus of variations was solved (U.S.).

Much attention was paid to the theory of differential equations, both ordinary and partial. Potential theory (originally the theory of solutions of Laplace's equation) was extensively developed and generalized, particularly in France. New methods were found for the study of nonlinear differential equations (U.S., Great Britain, U.S.S.R.). These are of importance in many branches of applied mathematics where it is necessary to improve the classical linear approximations; much of this work was connected with war problems and was still unpublished in 1946.

In the theory of functions of complex variables, although numerous special problems continued to be studied, there was an increased tendency toward the application of modern algebraic and topological methods (Germany, Scandinavia, U.S.). Notable advances were made in the theory of functions of several complex variables, particularly in

the theory of automorphic functions (U.S., China).

The field of functional analysis originally developed out of the study of integral equations and equations in infinitely many unknowns. It is usually regarded as part of analysis, but in its modern aspects it might also be considered as a branch of topology. The study, first of "spaces" whose "points" are functions, and then of similar spaces as abstract entities, was one of the most active fields of mathematics, particularly in the U.S., U.S.S.R. and Japan. The spaces known as Banach spaces were especially prominent, since they seemed to be the most useful for applications to other parts of mathematics. Partially ordered spaces were also studied. The theory of normed rings, which are both Banach spaces and rings (in the sense of abstract algebra), was extensively investigated; this theory seemed to have great potentialities for use elsewhere in analysis.

A closely related subject is ergodic theory, which deals with measure-preserving transformations and is of fundamental importance for dynamics and statistical mechanics. The subject was given fresh impetus by the introduction of new methods, brought into intimate connection with the theory of abstract spaces, and developed into an independent discipline.

Probability and Statistics.—In probability, the classical limit theorems were greatly extended and improved. The theory of stochastic processes, of importance in many physical problems, was further developed (U.S., U.S.S.R., Scandinavia, France). Theoretical statistics, particularly the theory of statistical tests, made rapid progress under the impetus of wartime needs; in particular, new methods in quality control, of sufficient practical importance to have been military secrets, became available to the mathematical public at the end of 1945.

Relativity.—The kinematical relativity of E. A. Milne was further explored, principally in Great Britain; a new theory of relativity propounded by G. D. Birkhoff was under investigation in the U.S. and Mexico.

Applied Mathematics.—Problems in elasticity, plasticity and hydrodynamics, particularly the hydrodynamics of compressible fluids, were extensively investigated in the principal countries engaged in the war. Probably by no means all the results obtained were generally available in 1946, but enough had been published to make it clear that significant new methods had been developed and that formerly intractable problems could now be handled. Another aspect of the wartime pressure for rapid solution of difficult problems was the development of several types of new high-speed computing machines. Many new mathematical tables were computed, particularly by the Mathematical Tables Project sponsored by the National Bureau of Standards (U.S.).

Publications.—Several new series of mathematical books were inaugurated in North America: *Princeton Mathematical Series* and *Annals of Mathematics Studies* (Princeton); *Mathematical Surveys* (American Mathematical society), *Mathematical Expositions* (Toronto). However, the number of books published declined during the war in all countries. Germany, once the centre of the mathematical book world, published little but new editions of older books. A great number of standard advanced mathematical treatises were reprinted by photographic processes in the U.S.

Three research journals of international scope were founded in Argentina, one in Brazil and one in Portugal. The increased interest in applied mathematics was attested by the founding of the *Quarterly of Applied Mathematics* (U.S.) and *Applied Mathematics and Mechanics*.

(U.S.S.R.). *Mathematical Tables and Other Aids to Computation* (U.S.) was the first journal to deal exclusively with the field indicated by its title. The American Mathematical society founded *Mathematical Reviews*, an international abstracting journal, in 1939. (See also PHILOSOPHY.)

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(R. P. Bo.)

Matrimonial Causes Act

See MARRIAGE AND DIVORCE.

Matsuoka, Yosuke

Matsuoka (1880–1946), Japanese statesman, was born March 3, 1880, in Yamaguchi. At the age of 13 he went to the United States, where he was converted to Christianity and was graduated from the University of Oregon law school in Eugene in 1900. Returning to Japan, he entered the foreign service and held several consular posts in China. Later he was elected to the diet, and from 1935 to 1939 he was president of the South Manchurian railway. In 1932, he defended his country's seizure of Manchuria before the League of Nations.

In June 1940 Matsuoka became foreign minister in Prince Konoye's cabinet and on Sept. 27, 1940, he signed the Tripartite pact with Germany and Italy. In March 1941 Matsuoka journeyed to Europe where he conferred with Hitler. In June 1941 Matsuoka was dropped from the cabinet. According to documents subsequently found in German confidential files, Matsuoka had assured Hitler that Japan would go to war as soon as possible.

Matsuoka was arrested Nov. 19, 1945, and was indicted with Hideki Tojo and others in April 1946 by the Allied International Military tribunal on charges of war crimes. His death was announced on June 27, 1946, while the trial was still in progress.

Matter, Structure of

See PHYSICS.

Maurice and Laura Falk Foundation, The

See SOCIETIES AND ASSOCIATIONS.

Mauritius

See BRITISH EAST AFRICA.

Measles

See EPIDEMICS AND PUBLIC HEALTH CONTROL; EYE, DISEASES OF; MEDICINE.

Meat

United States meat production had been moving steadily upward from 1900 with periods of notable decline in 1920, following World War I and in 1935, after the great drought. A high record of production had been reached in 1934, more than 18,000,000,000 lb., followed by a sudden drop to 14,400,000,000 lb.—less than the 1935–39 average. In 1937 the total was only 15,700,000,000 lb. By 1939 the total was back to 17,500,000,000 lb. and a steady increase followed to a record of 24,648,000,000 lb. in 1944. Favoured by ample feed supplies from accumulated grains under the ever-normal granary program and better-than-average weather for pastures, stockmen were able to make a quick start to meet the increasing demand

created by World War II. Record and near-record feed-grain crops for five years permitted a continuous increase in hog numbers and also an upswing in cattle numbers to a new high total. Sheepmen also built up their herds. In terms of liveweight of animals on farms and ranches, the total rose from about 34,000,000,000 lb. in 1939 to the top of 46,000,000,000 lb. in 1943. The increased feed crop was a result of wider use of hybrid seed corn, good yields of other feeds and the release of land formerly used to grow feed for horses and mules as they were replaced by tractors. Greater efficiency in livestock production was also a factor. The number of pigs saved per litter increased steadily. Better control of diseases and increased output from better feeding resulted. Bigger lamb and calf crops were recorded.

By 1944 the prospect of the end of World War II and consequent declining foreign demand for meats led to a down-turn of the cycle; by Jan. 1946 the number of all cattle, cows and sheep on farms was less than a year earlier, and the number of hogs was less than in the two record years of 1943 and 1944. The total of animal units on farms showed a decline and indicated that the World War II expansion was completed. The production of meat was expected to continue high because of the slaughter of the animals being sold as herds were reduced.

World War II brought about an increased demand for meat for the U.S. military forces and also for civilians. The high level of employment increased consumers' incomes and they demanded better food with a larger proportion of meat in their diets. This brought about rationing and other distribution controls even though there was an increasing supply of meat. Lend-lease created an extra demand that amounted to 6% of the supply in 1942, 9.3% in 1943, 6.5% in 1944 and an even greater part in 1945–46. The armed forces required about 16% of the total meat output during the five years 1940–45. Yet the supply was large and civilians consumed more meat than in pre-war years—a high of 150 lb. per capita in 1944 as compared with 125 lb. (1935–39 average). The war made the United States a net exporter of meat. Before the war live cattle were imported from Canada and Mexico amounting annually to several hundred million pounds of meat.

Cattle prices were slightly higher from January to June 1946 than in the same period a year earlier. During the period when price control lapsed in July 1946 beef cattle prices rose to the record level of \$30.25 per 100 lb. for a few loads at Chicago. When price ceilings were restored on Sept. 1, prices declined but were still higher than in June; after permanent decontrol they rose again.

The proportions of the different kinds of meat changed more than usual through the decade. In 1935–39 the percentages of each was as follows: Beef 43%, veal 6%, pork (excluding lard) 45% and lamb 6%. Roughly, cattle provided half and hogs and sheep the other half of the supply. In 1944, the year of highest production (24,648,000,000 lb., not including poultry), beef amounted to 37%, veal 7%, pork 52% and lamb 4%. The popular idea that beef was particularly scarce in 1944 and 1945 was not supported by the facts, since the production amounted to more than 9,000,000,000 lb. in both years. Veal production was a third above prewar, pork 75% higher, lamb and mutton 20%. Production had not been increasing so fast as the general increase in U.S. population for several years before the war. The rapid increase during the war years provided for the great increase of the supply for civilians at the same time that military and lend-lease and other



Meat-hungry shoppers jamming a Chicago butcher's shop following the decontrol of prices in Nov. 1946

export demands were taking about one-fifth the total supply.

The production of pork made the greatest advances during the decade. The pig crop increased from 62,000,000 head in 1937 to 122,000,000 head in 1943. At the same time the average weight of hogs slaughtered rose from 231 lb. per head in 1940 to 264 lb. in 1943 but declined to 255 lb. in 1946. A factor in this great increase in hogs was the support prices set at a relatively higher level and effective over a longer period. This rapid expansion of hog feeding used more feed than was being produced or was available from stocks. Farmers, therefore, had to curtail breeding operations in 1943 to bring hog numbers into better relation with feed supplies. The 1944 spring pig crop was 25% and fall pigs 34% below the respective crops in 1943. Consequently, the slaughter in the 1944-45 marketing year declined from 97,000,000 head to 75,000,000 head. The production of hogs moved in cycles of three to five years as the size of the corn crop varied. Hog raising can not be expanded so rapidly as it can be decreased, therefore when there is a sudden decrease in the corn crop the number of hogs is quickly reduced. From 1938 through 1943 there were large corn crops and hog numbers increased steadily. In 1943 the decline began with the reduction in feed supply.

Beef is supplied not alone by cattle raised for beef; about one-third of the supply comes from animals from dairy herds. Dual-purpose cattle continued to supply about 15% of the beef during the decade 1937-46. Only about 50% of the beef came from cattle kept primarily for beef. The fattening of cattle on grain and concentrates in feed-lots serves as a means of quickly increasing the total supply of beef.

About 5,000,000 head were fed on the average during the decade, and it was estimated to be about 12% of the total production of beef and veal. Feeders added about

1,600,000,000 lb. to the weight of animals put through the feed-lots.

The production of beef cattle moves in cycles of 10 to 15 years. Dairy cattle have less violent changes in numbers and increased more rapidly during the decade than did beef cattle. Dairying tended to grow with the increase in total population as milk consumption increased. The drought of 1934-36 caused a low point in the cattle cycle when thousands of animals were slaughtered by the Federal Surplus Relief corporation to prevent their loss from starvation. The year 1937 found total cattle numbers at a low point, fewer in number than in 1914 at the beginning of World War I. With the outbreak of World War II stockmen began to increase their herds; numbers on farms rose rapidly from about 66,000,000 head in 1937 to a peak of 82,364,000 head in 1944. About 41,000,000 head were strictly beef cattle, of which about 60% were grown in the 17 western states. The number of beef cattle in the central corn belt states did not increase so fast as in the northern plains states.

The number of dairy cattle increased steadily from 1937 to 1945, and the amount of meat provided by aged cows and calves formed a considerable part of the increasing meat supply. Calf slaughter increased after 1941; herds had been built up from about 9,200,000 head in that year to 13,620,000 head in 1944.

The part of the meat supply provided by sheep as mutton and lamb played a small part in the total increase. The total number of sheep did not increase after 1943 and in 1946 was smaller than in 1937. Sheep raising was at a low level from 1914 to 1928 but had recovered to above the level of 1900-14 by 1931. Shortage of labour and greater cost of production for lambs than other livestock affected the industry adversely. The uncertain future of wool prices led to the reduction of flocks in the range country after 1942.

Poultry meat made up a large part of the shortage in many regions. The average production in the prewar

period 1935-39 was 2,675,000,000 lb. of chickens and turkeys; other fowl were so few in number as to be unimportant. The prewar average of all meats from animals was 16,182,000,000 lb. in 1935-39. At the height of production in 1944, poultry meat amounted to 4,020,000,000 lb. compared to a total of animal meats of 24,670,000,000 lb. Prewar per capita consumption was 125.6 lb. of animal meats, 17.9 lb. of chicken and 2.6 lb. of turkey. In 1944 animal meat consumption had risen to 148.4 lb. per capita, compared with 23.6 lb. of chicken and 3.4 lb. of turkey.

The prices of all meat animals received by farmers in 1937 were at a peak after a period of advances beginning in 1933, the lowest point after 1910. A price decline continued through 1938 and the advance began which continued until 1943. Prices of all meat animals averaged about the same at the outbreak of World War II as in 1914 before World War I. Hog and sheep prices were lower in 1939, while beef cattle and lamb were higher. Beef cattle prices alone rose to higher levels than in World War I. The prices of animals were relatively more favourable to the stockmen than in the period 1916-20.

Retail meat prices moved up slowly from the low point in 1940. Prices declined between 1937 and late 1941, and the total cost of all foods was below the base level of 1935-39 during the three years 1938-40 inclusive. Meat prices, in comparison with the 1935-39 average, rose to 108 in 1941, 126 in 1942, 134 in 1943, then declined to 130 in 1944 and 131 in 1945 and remained at that level through early 1946. These prices represented the legitimate market. Had there been reliable statistics on the meat sold in "black market" channels, the average would have been much higher in 1944-46, when a considerable part of the total supply was reputed to be moving through illegal markets. Areas dependent upon in-shipment of meat were particularly hard hit in 1945 and 1946.

A crisis in the meat trade was reached in June 1946 when the shipments of livestock to markets reached a low level. The Big Three packers reported at one time that they had purchased only 8 head of cattle at a time when about 10,000 head had been shipped to the Chicago stockyards. These packers stated that they could not pay prices high enough to make purchases because of OPA ceilings. Meat packing plants on the eastern seaboard closed.

After July 1, when the OPA was inactive for several weeks, there was a heavy run of livestock to market as prices soared to record heights. There was an abundant supply of meat in all markets. Retail prices asked were higher than consumers would pay and then there was a recession. When OPA was restored, the shipments of livestock ceased almost entirely. A severe meat shortage developed in the late fall. After final price decontrol late in 1946, however, the supply again became plentiful.

Government subsidies for meat animals were paid after June 1943 for the announced purpose of holding down the price of meat to consumers and maintaining or increasing returns to producers and thereby fostering the supply. A third objective was to ensure meat processors against losses caused by government price control. Slaughterers were forced to comply with the ceiling prices to be eligible for subsidy payments. Subsidies were paid to non-federally inspected slaughterers on a part of their output to obtain better meat distribution in deficit meat areas. When ceiling prices of meat were reduced about 3 cents per pound retail in 1943, slaughter payments of \$1.10 per 100 lb. on cattle, \$1.30 per 100 lb. on hogs and 95 cents per 100 lb. on sheep were begun. This was called the "roll-back" of meat prices. Various changes were made from time to time

through 1943-46. This program was under the Reconstruction Finance corporation and amounted to a total of more than \$1,500,000,000 up to the spring of 1946. In May 1945 the Commodity Credit corporation began the payment of direct subsidy payments to producers. These payments began with the payment of 50 cents per 100 lb. for cattle of 800 lb. or more to induce feeding to heavier weights. These subsidies amounted to about \$14,500,000 in 1945 and \$2,800,000 on cattle in Jan. 1946 alone. The subsidy program for sheep and lambs began in Aug. 1945 at varied amounts, \$1.50 to \$2.50 per 100 lb. for 65 to 90 lb. lambs, and \$2.15 to \$3.15 for lambs weighing more than 90 lb.

The CCC paid out about \$10,000,000 in 1945 under this program.

World Production.—World meat production declined as a whole during the decade 1937-46 and most rapidly during 1945-46. In the United Kingdom meat production in the 1945-46 season was 800,000,000 lb. below the prewar average level of 2,800,000,000 lb.; and the 650,000,000-lb. average imports from Europe were not available during World War II. While larger amounts were imported from both North and South America, the United Kingdom's consumption remained at about 80% of the prewar level. Canada, New Zealand and Australia limited meat for their civilian populations in order to ship more to Britain. In Europe total meat production had dropped from a prewar average of about 25,200,000,000 lb. to 14,200,000,000 lb. in 1945-46, largely as the result of military operations and the lack of imported feed grains. Lack of feed reduced pork production in Denmark about one-half. In the soviet union great losses were due to the German invasion, but by 1945 livestock numbers had increased so that the meat ration was increased materially. The world's totals were maintained by expansion of production in the U.S., Canada and Argentina largely because of the large feed supplies. The great demand for grains for relief needs was a limiting factor in the recovery of livestock production in all countries. A survey of the world's cattle numbers in 1945-46 showed the total to be about 709,800,000 head as compared with an average of 723,000,000 head in 1936-40. (See also BACON; CATTLE; HOGS; LIVESTOCK; POULTRY; PRICE ADMINISTRATION, OFFICE OF; RATIONING; SHEEP.) (J. C. Ms.)

Production of Meat in United States, 1937-46
(In Pounds)

1937	15,709,000,000	1942	21,738,000,000
1938	16,479,000,000	1943	24,136,000,000
1939	17,534,000,000	1944	24,648,000,000
1940	18,995,000,000	1945	22,891,000,000
1941	19,493,000,000	1946	21,880,000,000

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Mechanized Warfare

See TACTICS OF WORLD WAR II; WORLD WAR II.

Medals

See DECORATIONS, MILITARY, NAVAL AND CIVIL.

Mediation Board, National

See NATIONAL MEDIATION BOARD.

Medical Association, American

See SOCIETIES AND ASSOCIATIONS.

Medical Research, Committee on

See WAR AND DEFENSE AGENCIES.

Medicine

In 1935, a German investigator named Gerhard Domagk announced the development of a dark red dye substance which was called sulfanilamide. This discovery opened the era of the antibiotic drugs in medicine. It marked a period in which greater advance was made against the infectious diseases as causes of death than ever before in the history of medical science. The opening of this path caused research workers everywhere to embark on the creation of modifications of sulfanilamide, so that by the end of the decade 1937-46 hundreds, if not thousands, of preparations had been developed, and many infectious diseases were being brought completely under control.

Sulfonamides.—The sulfonamides contain in common a chemical group including sulphur, oxygen and nitrogen. The exact method of action of these drugs on the germs that respond to them was still uncertain at the end of the decade. Apparently, however, they interfere with the proper functioning of certain enzyme systems that are essential to the growth and survival of the bacteria. If the sulfonamide drug is present in moderate amounts, the multiplication rate of the germs is decreased. This is known as bacteriostasis. If the drug is present in large amounts, as, for instance, when the sulfonamides are applied to an infected wound, the germs may actually be killed. This is known as a bactericidal effect. Investigations have shown that one of the derivatives of the vitamin B complex, known as para-aminobenzoic acid, acts to prevent the action of the sulfonamide drugs. Apparently also there are substances present in pus and in necrotic tissue which can interfere with the action of the sulfonamides. For that reason infected wounds are first cleaned by removal of the pus and the dead tissue so that the sulfonamide may act effectively.

Extensive study on various forms of the sulfonamides showed that some act more effectively against some germs, others against other germs. Physicians are likely, therefore, when a patient is in a hospital, to have a bacteriologic diagnosis of the infection in order to give the drug that has the best effect. When there are infections with the haemolytic streptococcus, sulfadiazine is the drug of choice; sulfanilamide, second; sulfapyridine, third and sulfathiazole fourth. Infections with the pneumococcus are best treated with sulfadiazine, with sulfathiazole second choice and sulfapyridine third choice. Gonorrhoeal infections respond best to sulfathiazole, with sulfapyridine second choice. The original sulfanilamide is not used in the treatment of infections with the gonococcus if these improved sulfonamide drugs are available. For staphylococcus infections, sulfadiazine or sulfathiazole may be used. Sulfadiazine is also considered to be the first choice for infections with the meningococcus, although the other sulfonamides are effective.

Once the usefulness of these products was established, new techniques were developed for giving the sulfonamides by other methods than direct injection into the blood or application to infected wounds. Preparations were developed to be given by mouth, for use as lozenges in infections of the mouth and throat and for use in the form of sprays mixed with air or oxygen and as vapours. Such vapours are used in respiratory diseases like infections of

the bronchial tubes and lungs, of the sinuses, nose and throat.

Studies continued to be made with the use of the sulfonamides in attacks against various diseases caused by viruses. Apparently they have some effectiveness against trachoma, follicular conjunctivitis and venereal granuloma.

Interesting also was the use of sulfonamides as a preventive of epidemic infections of the nose and throat. In many army camps all soldiers were given daily dosages of sulfadiazine, and the incidence of infection was greatly lowered.

Crystalline sulfonamides were developed for local use against certain bacterial infections, particularly those caused by streptococci and staphylococci. New antibacterial preparations were also developed which could be used locally with the sulfonamides to great advantage.

Tyrothricin.—Subsequent to the development of the sulfonamides new importance attached to tyrothricin, an antibiotic developed by René de Dubos from a bacillus called *Bacillus brevis* found in the soil. Tyrothricin consists of at least two substances, gramicidin and tyrocidin. This drug is not used in the interior of the body either by injection or by mouth because of its toxic character. It is, however, of value in treating superficial ulcers caused by Gram-positive germs, that is to say, germs which stain with the Gram stain. Apparently it does not exert any effect unless it comes into direct contact with the infecting agents.

Penicillin.—Moved by the needs of the British army in World War II, British investigators, including particularly Sir Alexander Fleming, Howard W. Florey and E. Chain, developed the use of a mould called penicillin which had been found by Fleming some years before to be especially effective in preventing the growth of pus-forming germs. Penicillin is a solid extract of organic nature obtained from these moulds, and the extract possesses the property of inhibiting the growth of certain germs and even destroying them. The extract can be prepared in the form of salts of penicillin, including sodium, calcium and ammonium salts. For this work the investigators mentioned received the Nobel prize in medicine.

Penicillin was found especially effective against infections with the staphylococcus, the diphtheria organism, the streptococci, pneumococci, gonococci and meningococci. Its value in the treatment of gonorrhoea and syphilis particularly made it seem likely that for the first time there was a possibility of complete elimination of these venereal diseases. Especially important was the use of penicillin in overcoming subacute bacterial endocarditis, a condition formerly considered invariably fatal but from which, by the end of the decade, perhaps one-third of those infected were recovering.

Streptomycin.—Later streptomycin, another antibiotic drug, was developed by Selman A. Waksman. This became the best preparation for use against tularemia, certain forms of tuberculosis and other infections. Indeed it was predicted that streptomycin might prove to be a sovereign remedy against tuberculosis. It was pronounced the most effective remedy yet discovered against infections in the urinary tract.

Still other antibiotics included subtilin, derived from the *Bacillus subtilis*, patulin and bacitracin. There were no definite limitations on the total number of antibiotics that might ultimately be developed, since there are many thousands of moulds, each of which was being investigated as to its effectiveness against certain forms of infection.

The antibiotics opened a new approach to the attack against infections. By their use the death rate from pneumonia was reduced from more than 25% to an average of

7%. Among U.S. troops in World War II, the death rate from pneumonia was less than 1%, as contrasted with more than 20% in World War I.

Other New Remedies.—Among other new remedies was tridione, especially effective against some forms of epilepsy and other convulsive disorders. Experts in the field of epilepsy who tested its use on many cases, checking the use with the electro-encephalogram or so-called brain wave machine, reported that it was especially useful in averting completely attacks of petit mal but not quite so effective against the serious convulsions of grand mal epilepsy.

Research on the allergic disorders revealed that the allergic attack is accompanied by a release of histamine into the blood. The French first experimented with a preparation which was an antihistamine and found it useful against asthma, urticaria, hay fever and food sensitivities. The French product was called antergan but was revealed to be somewhat toxic. U.S. investigators produced preparations equally beneficial and much less toxic. The first of these, known as benadryl, was to produce attacks of sleepiness in some patients. Later, pyribenzamine was found even more effective in such cases, particularly in urticarias, and to be even less toxic than benadryl. Investigations continued, and it was apparent that a great advance had been made in treatment of the allergies.

The endeavour to find a drug useful against excessive activity of the thyroid gland, such as occurs in hyperthyroidism, led to the development of products called thyroid genes. Among these was thiouracil and other modifications with a variety of names. These drugs apparently have the ability to diminish the pulse rate, excessive perspiration and other manifestations of excessive action of the thyroid. They also lower the basal metabolic rate. A considerable number of people, however, develop a sensitivity to thiouracil and respond with temporary loss of great numbers of white blood cells, thus becoming easily infected. This condition is known as granulocytopenia and also as agranulocytosis. Investigators found that penicillin may be used simultaneously with thiouracil, thus protecting the patient against infections. Because of the manifest dangers, warning labels were placed on all prescriptions for this product.

Malaria was the major threat during World War II. Under the Division of Medical Sciences of the National Research Council and the Committee on Medical Research, some 20,000 preparations were devised and tested. Early in the war atabrine, known in Great Britain as mepacrine and listed in the United States *Pharmacopoeia* as quina-craine, was considered most effective. U.S. production rose from 50,000 tablets per year to more than 2,000,000,000 tablets annually. Later, two other preparations were found specifically effective against certain forms of malaria—chloroquine and pentaquine. Still later, members of the 8-aminoquinoline group of compounds—one known as SN 13276—were reported actually curative in malaria caused by infection with the *Plasmodium vivax*.

A new narcotic called demerol and known in Europe as dolantin began to be widely used in U.S. medicine. Investigations indicated that it was a powerful and quick-acting narcotic. Claims were made that the product was less addictive than opium and morphine. Indeed it was claimed to be as relatively innocuous as codeine. Nevertheless, the bureau of narcotics of the United States government reported a considerable number of cases of primary addiction to demerol, which was placed under the Harrison Narcotic act. In the meantime investigations continued with other narcotic preparations believed to be less toxic

and less addictive than demerol.

Curare, commonly called the South American arrow poison, was developed as an extract in pure form called intocostin. This drug is used to control muscle spasms in infantile paralysis and in other forms of spastic paralysis. It was used to great advantage for soldiers who suffered wounds of the spinal cord. It was used also in the treatment of babies born with brain haemorrhage which caused them to be spastic infants. Particularly useful was the employment of curare to bring about maximum relaxation before surgical operations. Curare used in this way made possible the use of smaller amounts of inhalant anaesthetics like ether, ethylene and nitrous oxide-oxygen with more profound unconsciousness and relaxation.

The U.S. chemical warfare service reported that a by-product of mustard gas which acted directly on the tissues that produce white blood cells could be taken into the body and used against diseases like leukaemia and Hodgkin's disease, in which there is an enormous increase of the white blood cells. This product is, however, quite toxic. By the end of the decade it had not been reported effective in curing either leukaemia or Hodgkin's disease in the advanced stages. Nevertheless, the product was the most promising thus far found, and unquestionably would have wide use on an experimental basis until its values and limitations could be determined.

The British, in the course of their attempt to control poisoning with lewisite, developed a product commonly called British anti-Lewisite or BAL, valuable for overcoming the symptoms of poisoning with mercury and arsenic. Thus one of its special uses is as an antidote against arsenical poisoning and against reactions to arsenic in patients given large doses of arsphenamine or similar preparations in the treatment of syphilis.

The development of the atomic bomb focused attention on substances made radioactive by the use of the cyclotron. These are known as radioactive isotopes. Radioactive iodine was used to overcome excessive action of the thyroid gland. This product could be taken by mouth in solution. Other radioactive isotopes, such as those of calcium, were used to carry radioactivity into the bones. Radioactive sodium can be injected into the veins and its progress traced through the veins into various portions of the body. Thus the rate of circulation can be measured, and it can be determined whether or not there are inflammations of the lining of the blood vessels, which slow the circulation. Radioactive isotopes of strontium and potassium were used because these elements tend to localize in certain organs. Radioactive phosphorus was used particularly for conditions affecting the blood and seems to have had exceeding success in conditions in which there is a tremendous increase of red blood cells, as in polycythaemia.

Among the most frequent of conditions developed during World War II was gastric ulcer, the increase being associated with psychosomatic causation. Anxiety and fear play a major part in the occurrence of gastric ulcer. Among methods of treatment new to this condition were the feeding of neutralized, filtered and preserved gastric juice taken from normal people, also the feeding of mixtures of the amino acids. However, the standard treatment of neutralization of the acid of the stomach by alkaline powders continued to be considered most frequently successful.

The wide spread of infection with fungi such as ringworm focused attention on specific methods of prevention and treatment of this condition. Investigators in the navy reported that a combination of undecylenic acid (2%),

zinc undecylenate (20%) and ordinary talcum powder was the best preventive powder against the fungous infection of the feet. Ringworm infestation of the scalp also spread widely throughout the United States and was believed to be associated with the practice of children, sitting in the movies, of rubbing the back of their heads on the chair. Ringworm of the scalp was detected by the use of the ultraviolet ray, and treatment included complete removal of the hair with direct application of fungicidal remedies, among which undecylenic acid had a high place. (See also CHEMOTHERAPY.)

Preventive Medicine.—Outstanding in the prevention of disease during World War II was the application of prophylactic vaccines against a great variety of tropical disorders, including particularly vaccines against typhus, yellow fever and dysentery, also smallpox, tetanus, typhoid and paratyphoid fevers. Additional vaccines were made available against other plagues to which soldiers might be exposed.

In the course of vaccination against yellow fever, more than 70,000 men developed jaundice. Search for the cause of the jaundice revealed that a virus had apparently been transmitted in the serum used in the vaccine by one of the agencies which prepared it. This led to the detection of a new condition called epidemic hepatitis with a specific virus. Elimination of the use of serum in the preparation of the vaccine resulted in ending the outbreak of jaundice associated with vaccination against yellow fever.

A vaccine was developed against the virus A and B types of influenza. Demonstration of the usefulness of this vaccine on millions of members of the United States army preceded release of the product for use among the public. By 1946 this vaccine was being manufactured in millions of doses and probably would be effective in preventing such devastating outbreaks of epidemic influenza as had occurred in the past. In most instances such epidemics had a high mortality because of the secondary invasion of the body by virulent streptococci of the type of the haemolytic streptococcus and the streptococcus viridans. Since such streptococci were now controllable by the use of the sulfonamide drugs and the antibiotics like penicillin and streptomycin, the probability prevailed that outbreaks similar to those which devastated mankind every 25 years in previous centuries would either not occur or would be controlled.

Significant in the field of preventive medicine was the development and use of blood derivatives for the prevention of a considerable number of diseases. The American Red Cross, which had previously purchased and distributed for free use by the people of the United States all of the gamma globulin developed through the collection of blood in blood banks, followed that procedure by purchasing all of the surplus blood plasma. This surplus was considered to be sufficient for two years. It was to be distributed through state health departments. Gamma globulin is effective as a preventive of measles and also is useful in lessening the severity of an attack of that disease. This is especially important when the globulin is used in institutions such as schools and orphanages where younger children ill with other diseases may contract measles by exposure to modified cases. Gamma globulin was also found useful in lessening secondary complications in mumps as, for instance, in orchitis, inflammation of the testes, or ovaritis, inflammation of the ovaries, both serious complications. Blood plasma was useful in preventing mortality from shock, burns and haemorrhages.

A conspicuous development in the field of preventive medicine was the use of DDT (dichloro-diphenyl-trichloroethane) in sprays and through widespread dissemination by the use of aeroplanes. Thus great areas were freed from the menace of the mosquitoes that carry malaria and flies known to be carriers of various other forms of infection. In fact, the development of DDT and a host of related products represented one of the greatest advances ever made in medical science. By the use of this product it became possible to control epidemics of typhus. The manner in which the preventive medicine section of the U.S. army stopped in its early stages a threatening epidemic of typhus in Naples was hailed throughout the world. In this procedure, DDT powder was sprayed in all of the slum areas of Naples as well as into the clothing and over the skin of all of those who might be exposed to contact with the lice that spread typhus.

In connection with the control of malaria, aerosol bombs were developed which could be broken in a tent in which soldiers were sleeping and thus prevent bites by insects that carried disease. So effective were the anti-malarial procedures of the forces of the United States that many islands of the Pacific were made free of such insect pests. On one island where clouds of mosquitoes had incapacitated troops it became possible after several months for soldiers to sleep without even the protection of mosquito netting. Swamps were drained, DDT was sprayed by aeroplane, aerosol bombs were used in the tents and thus complete control was established.

Conspicuous also was the development of a new poison for destroying rats, known by the contracted name ANTU. With this preparation the menace of plague, spread by fleas from rats, was also controlled and did not prove to be at all a hazard to U.S. troops working in plague-infested areas.

Among the new diseases which attracted medical attention and which demanded particularly the service of epidemiologists was a wide variety of atypical pneumonias caused by viruses. Investigations showed that pigeons or other birds frequently carry a condition called ornithosis, a disease caused by a virus and similar to the disease known as psittacosis or parrot fever. The viruses produce an inflammation in the lung. They are not susceptible to attack by the sulfonamide drugs or by penicillin or streptomycin. Fortunately, however, except for psittacosis, they are not severe. The conditions are best detected by the symptoms that they produce and by the use of the X-ray. People who take care of pigeons are frequently infected with ornithosis. Because of the possibility that pigeons might be responsible for the spread of virus pneumonias, the suggestion was made that pigeons in all cities be destroyed and that steps be taken to eliminate these birds by control of feeding and shelter. Subsequent investigations revealed, however, that few people were infected with the virus carried by pigeons except those directly working with these birds. Patients with the virus pneumonias were usually given the antibiotic drugs for the prevention of secondary infections with the germs which these drugs can control.

In the prevention of the spread of infections with respiratory diseases, two new procedures were found especially valuable. One was the use of aerosols or sprays placed on blankets or floors of barracks and schools. The aerosols are mists containing antiseptic drugs which can be sprayed in amounts sufficient to control to a considerable extent the dissemination of the germs that are contained in droplets in the air. When anyone sneezes or coughs, thousands of droplets containing germs are spread



Seriously wounded British veterans of the North African front in 1942 being loaded into an air ambulance for transportation to large base hospitals in the rear

into the air. The use of oils and the control of floating dusts by the use of oil mops was also found to be helpful in keeping down the germ population of the atmosphere. Effective also was the use of ultra-violet rays for disinfection of the air, particularly in surgical operating rooms but also in children's wards of hospitals and in orphanages and institutions. Studies were made as to the best methods of using ultraviolet for this purpose. Special apparatus had to be developed, also means of protecting those exposed to ultra-violet from overdosage.

Another technique for the control of respiratory disease was the administration of daily doses of sulfonamide drugs, usually sulfadiazine, to persons assembled in considerable numbers in barracks, schools and such places. A single dose given daily proved to be efficient in lessening by one-half the amount of infection as manifested by sore throats, fever and colds.

Toward the end of the war much excitement was occasioned by the announcement that a Russian, Alexander A. Bogomolets, had developed a serum called ACS, or the anticytotoxic serum, which he claimed would be useful in a variety of infections, in prolonging life and in controlling cancer. The serum was based on the idea that the connective tissue cells of the body are involved in processes which tend to shorten life by giving out a toxic substance. The Bogomolets serum proposed to immunize the tissues of the body against this toxic substance. Actual investigations conducted in the United States failed to confirm the claims made for this product in relation to any control whatever over cancer, nor did it appear to be useful in prolonging life. Bogomolets himself died suddenly at the age of 64. Some studies made on the use of the anticytotoxic serum in the healing of wounds and fractures seemed to indicate that it might have a beneficial effect, but these studies were made on small numbers of animals and human cases and seemed to require much additional evidence before the real value of the product could be determined.

Experiments with infected wounds revealed that an

antiseptic substance called furacin was useful in eliminating many of the germs not affected by penicillin. Thus combinations of furacin and penicillin were much more effective in the control of such wounds than either product used alone.

Conspicuous among new infections which became widespread was infectious hepatitis. This condition, already mentioned under the discussion of the jaundice associated with vaccination against yellow fever, was formerly confused with many other forms of jaundice. When it occurred in epidemic form, the condition was called chronic catarrhal jaundice. Investigations indicated that the virus responsible can be transferred through the injection of infected blood. One outbreak was definitely traced to the use of contaminated drinking water from infected wells, and other outbreaks seemed to be associated with the use of the swimming pool.

Whooping cough was formerly considered uncontrollable by the use of any vaccine or serum. Later, studies of the nature of the organism responsible for whooping cough and new methods of preparation of vaccines permitted the approval of vaccines against whooping cough with especially prepared pertussis vaccine.

Diphtheria appeared throughout the world in exceedingly severe forms, in some instances uncontrollable by any of the diphtheria antitoxins available. It became necessary to isolate these new forms of the diphtheria germ so as to prepare new concentrated diphtheria antitoxins capable of controlling these forms. Through the advances made in the creation of vaccines and antitoxins, the National Institute of Health established official potency tests for the following antitoxins and vaccines: botulinus antitoxin, diphtheria antitoxin, *Clostridium histolyticum* antitoxin, *Clostridium oedematiens* antitoxin, staphylococcus antitoxin, tetanus antitoxin, scarlet fever streptococcus antitoxin, perfringens antitoxin, vibron septique antitoxin, diphtheria toxin-antitoxin mixture, diphtheria toxoids, tetanus toxoids, antidysenteric serum, antimeningococcic serum, type specific antipneumococcic serums, bacterial vaccines prepared from the typhoid bacillus, diphtheria toxin for the Schick test and scarlet fever streptococcus

toxin for the Dick test and for immunization.

Vitamins.—During the decade 1937-46, investigations of the vitamins were focused on finding new ones and determining new uses for them. The vitamins were now considered to be substances essential for the maintenance of normal metabolic functions. Not identical with the more familiar nutrients like proteins, carbohydrates, fats and minerals, the vitamins are not synthesized in the human body in normally adequate amounts and therefore must be furnished to the body by a supply coming from without.

By the end of the decade, more than 20 naturally occurring compounds with vitamin activity had been isolated and identified. There were also available preparations in pure synthetic form with the same properties which occur in nature.

As a result of investigations, scurvy, beriberi, rickets, pellagra and xerophthalmia were attributed with certainty to the lack of specific vitamins. Thus these vitamins came to be known as the antiscorbutic vitamin (vitamin C), the antineuritic vitamin (thiamin), the antirachitic vitamin (vitamin D) and the pellagra-preventing vitamin (nicotinic acid).

Chemical, physical and microbiologic methods were developed for determining the presence of vitamins in pharmaceutical products. For some vitamins, including vitamin D, studies still remained to be made on living animals to determine their effectiveness. The Health Organization of the League of Nations sponsored the preparation and distribution of standards for the well known vitamins, and international units were developed for each. The units established by the United States *Pharmacopoeia* are identical with the international units of the Health Organization of the League of Nations.

Thiamin appeared to be the vitamin most frequently deficient in the diet of Americans. An adult requires about 300 international units, equivalent to about one milligram of pure thiamin, per day.

Para-aminobenzoic acid was found especially effective against certain rickettsial disorders, such as scrub typhus or tsutsugamushi disease. Pyridoxine was related to metabolism and had extensive experimentation in muscular disorders.

Because of a shortage of certain vitamins in ordinary diets in the United States, much attention was given to the use of enriched bread containing extra amounts of calcium, thiamin and iron.

Mixtures of vitamins derived from the vitamin B complex were found useful in the treatment of diabetes because of the special virtues of these derivatives in the oxidation of sugars. Vitamin C was found to be useful in encouraging healing of wounds. Healing is much slower when there is a vitamin C deficiency, but it is delayed in the absence of any of the essential elements in the diet.

Vitamin D was found to be not a single substance but a variety of substances (sterols). These were used in a number of conditions, including deficiency of the parathyroid glands, also against rickets and in a variety of spasmodic disorders related to a deficiency of absorption of calcium.

Especially significant among vitamin studies were those made to determine which are necessary for the growth of germs in cultures. Claims were made that vitamin E, tocopherol, was useful in preventing and controlling a variety of disorders of the nervous system and also certain weaknesses of the tissues of the heart. None of these claims could be confirmed.

Some physicians reported that the regular use of fairly large doses of vitamin E by women in the menopause helped to reduce the serious symptoms in a manner similar to the use of estrogenic hormones.

Severe deficiencies of vitamin A in the diet were associated with changes in the cells on the outer surface of the skin, replacing the ordinary cells with hardened material called keratin of the type in fingernails and calluses. Similar changes may occur in the eye.

Vitamin P was claimed to have a special relationship to fragility of the blood vessels. Apparently this vitamin does not affect the fibrinogen or the blood platelets but controls certain forms of haemorrhage because of its relation to the capillaries.

Newest among the vitamins during the decade was folic acid, also known as the *L. casei* factor, which was found to be especially related to the production of red blood cells. The claim was made that it could substitute for liver extract in the treatment of pernicious anaemia. The drug was also especially effective for the anaemia associated with sprue.

Vitamin K was discovered and named by H. Dam of Copenhagen in 1935, when he discovered a fatal haemorrhagic disease in newly hatched chicks which could be cured or prevented by giving a certain fraction of hog liver or alfalfa. This substance was developed as vitamin K₁ and vitamin K₂. The common name menadione was developed for these products by the Council on Pharmacy and Chemistry. Apparently a deficiency in the absorption of vitamin K results in the lack of the substance called prothrombin in the blood. Vitamin K is not properly absorbed when the flow of bile is obstructed. Prothrombin is not formed by the liver unless vitamin K is available. When a deficiency of prothrombin is due to obstruction of the flow of bile, surgeons give bile salts with vitamin K. Investigations proved also that the incidence of haemorrhage in newborn babies could be reduced by administering vitamin K to the mother before delivery. Customarily this is injected, and the use of amounts as small as 1½ to 2 milligrams insure that the newborn infant has a normal amount of prothrombin in the circulating blood. (See also VITAMINS.)

Surgery.—War experiences greatly improved surgery of the chest. In World War I, 70% of men wounded in the chest died of their wounds. In World War II the mortality rate was reduced to 20%. This advance in surgery of the chest was credited to several contributing factors. Surgical teams were developed, and patients were brought promptly to such competent surgeons. Immediate first aid, including blood transfusions, the use of sulfonamide drugs to prevent infection and prompt administration of measures to overcome shock, brought the patient with wounds of the chest to the surgeons in better condition to undergo serious operative procedures. Reports indicated that failure to apply similar techniques resulted in the same high mortality for wounds of the chest in the German army in World War II as in World War I. The experience with surgery of the chest in the earlier war was reflected in advances in chest surgery in civil life.

Conspicuous were operative procedures on the heart and the blood vessels. A small percentage of babies are born with an anomalous condition of the heart and the circulation of the blood, so that an adequate amount of blood does not go through the lungs and receive oxygen. These children become "blue babies." Drs. Alfred Blalock and Helen B. Taussig at Johns Hopkins Hospital, Baltimore, Md., developed a surgical technique for rerouting the blood so as to get a sufficient amount through the lungs.

They operated on many children with severe degrees of cyanosis or blueness and brought the condition under control so as to permit normal development of the child. In the operation one of the large systemic arteries is connected to one of the large arteries that goes to the lungs. Cases were brought to Johns Hopkins from all over the world—in some instances with funds raised by newspaper campaigns. Other surgeons proposed improvements on the original technique. A clamp was developed with which it became possible to shut off to a large extent the blood passing through the aorta (the large blood vessel going directly from the heart) and thus permitting anastomosis or joining of the artery going to the lung directly with the large vessel from the heart. Several recoveries were announced in severe cases in which infants were extremely blue and death was expected momentarily.

A new approach to the prostate gland added a fourth technique to those already used for removal of an enlarged or cancerous prostate gland. The new technique was called the retropubic extravesical technique. The approach to the gland is from the back of the lower portion of the body, and by this technique the operation stays away from the urinary bladder.

Many advances in technique were proposed. In operations on the gall bladder and the tubes that carry the bile from the gall bladder to the intestines artificial metal tubes of vitallium were substituted for the bile ducts. In other instances the bile duct was reconstructed over a vitallium tube so that, after healing, the tube passed on through the intestine and from there passed out of the body.

Conspicuous among developments in reparative surgery were the creations of banks of tissues to be used in plastic repairs. Especially noteworthy during World War II was the utilization of the traveling graft. Thus flaps of skin may be moved from one portion of the body to another where extra skin is needed. Methods were developed for tattooing skin grafts with pigment so that they would blend with the surrounding skin. Surgeons reported transplantation of whole sections of a toe to take the place of a thumb or of portions of fingers that had been lost. Following experience with the creation of banks for the storing of blood plasma and other derivatives of blood, banks were developed for the storage of such tissues as the cornea of the eye, pieces of nerves to be used in nerve grafts, portions of the skin, pieces of cartilage and pieces of bone. Refrigeration of grafts of skin may keep them available for a long time. In plastic surgery procedures the blood derivatives called thrombin and fibrin foam, derived from whole blood, helped to promote the attachment of the new graft to the place of its location.

Experience in war also improved greatly surgery of the oesophagus. Operations were performed chiefly for cancer. Mortality from such operations previous to the war approximated 50% whereas such procedures at the end of the decade approximated 20% mortality.

Much of the improvement in surgery was related to the advances in knowledge of anaesthesia, so that patients could be kept free from pain and unconscious for longer periods of time (*See below*). The tissues are greatly relaxed, and restorative measures using blood and protein substances aid recovery. In this connection also the anti-clotting substances were greatly used by the surgeons. The product called dicoumarol and the one called heparin helped to prevent postoperative thrombosis—clotting—and embolism—movement of a clot through the blood stream. By application of the antibiotic drugs before and during operative procedures, secondary infections were minimized and mortality rates were tremendously reduced.

Secondary peritonitis after operation for removal of the appendix became exceedingly rare. Operation on the mastoid because of infection almost disappeared from a good many hospitals. One institution for the care of children reported only five cases of operation on the mastoid in 1946, whereas 20 to 25 patients were always in the hospital for operation on the mastoid and aftercare five years previously.

The advancement in orthopaedic surgery was reflected in improved operations for restoration of function of the limbs, including transplantation of muscles, ligaments and nerves. New splinting devices were developed, and the tendency to early movement with the use of a so-called ambulatory splint became pronounced. The Stader splint involves insertion of pins into the fragments of bone and the interlocking of these pins with an adjustable splinting device. With this device persons whose bones have been fractured can walk or use the arms within one or two days after the fracture occurs.

Following suggestions coming from abroad, U.S. surgeons adopted as routine procedure the injection of local anaesthetics directly into joints for the relief of pain and into areas in which bursas had become inflamed, making movement difficult. This became a common treatment for bursitis and for severe sprains.

Among new methods which were highly developed was the use of electrocoagulation during operative procedures. Dissection by a heated knife or wire became a standard method for removal of tumors of the brain, for operations on the gall bladder and other procedures in which bleeding may be profuse. For the control of haemorrhage the application of thromboplastin and fibrin foam developed into a life-saving measure.

For removal of enlarged prostate glands in the absence of cancer, a common procedure was electrocoagulation and dissection by a heated knife introduced into a cystoscope. Whereas operations on the prostate gland formerly had a high mortality and involved hospitalization for months, the mortality was reduced to a few per cent, and patients were enabled to undergo the operative procedure and leave the hospital within a week.

Especially important also was the development of surgery of the nerves and blood vessels for repair and rehabilitation following serious accidents or wounds. The sewing of a torn or broken nerve is about as delicate a task as is known to medicine. In World War I doctors used linen and silk thread and also human hair for this purpose. New procedures included the use of a form of fibrin derived from clotted blood and dropped between the torn ends of nerves. The nerve is then drawn together with fine silk. Sheaths of metal and of tissue of various kinds were developed for surrounding nerves joined together.

The Russians claimed to have grafted nerves from corpses to living persons.

Operations were done on the heart of persons with angina pectoris resulting from insufficient circulation of blood to the heart muscle. In one procedure the sac containing the heart was opened and a small amount of powder rubbed on the tissue. This caused adhesions and the development of a new blood supply. Similar operations were attempted for cases of coronary thrombosis in which the blood vessels which supply the heart with blood were blocked. (*See also SURGERY.*)

Anaesthesia.—Improvements in anaesthesia were of vast benefit in promoting the science of surgery. The specialty

of anaesthesiology developed. This includes not only protection of the patient against pain and shock but also the administration of various solutions such as blood, glucose and other restorative materials before, during and after operative procedures.

Curare, the South American arrow poison, was used to produce relaxation of muscles before the giving of anaesthetics. This resulted in lessening the amount of anaesthetic required for complete relaxation and unconsciousness.

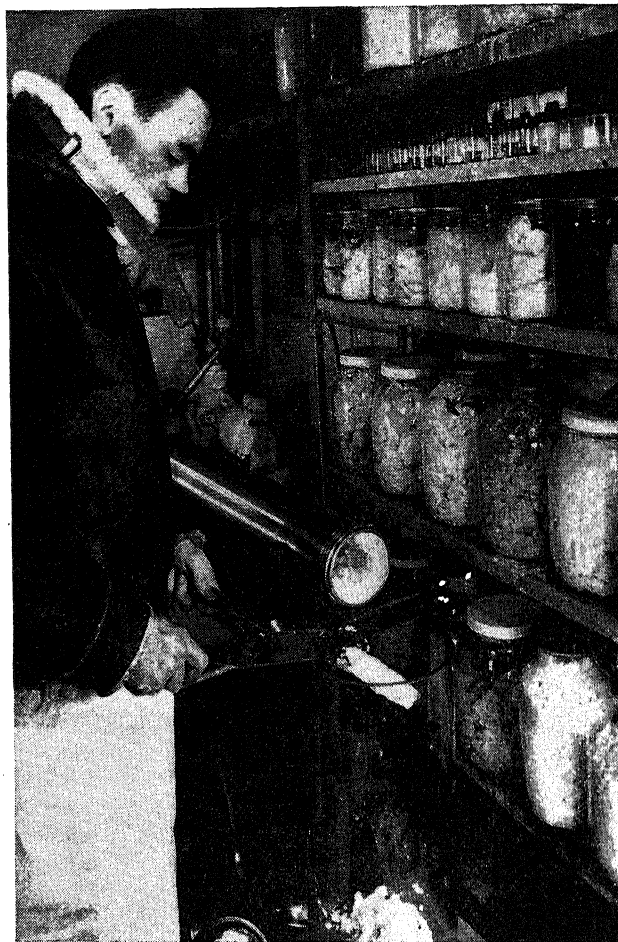
New methods of giving anaesthesia, including direct injection of anaesthetic substances into the blood, the use of anaesthetics in the spinal canal to block the nerves and the use of small amounts of anaesthetics continuously administered to maintain blocking over long periods of time, were introduced. Local anaesthetics were developed for operative procedures carried on without loss of consciousness by the patient. Combinations of sedative drugs like the barbituric acid derivatives and various anaesthetic gases also resulted in lessening the total amount of anaesthetic required.

Restorative substances like helium and oxygen were of aid also in lessening the risk of anaesthesia. New techniques were developed for the control of explosions of anaesthetic gases. (See also ANAESTHESIOLOGY.)

Obstetrics.—Outstanding among obstetrical procedures that attracted attention during the decade 1937-46 was caudal analgesia as a technique for preventing pain during childbirth. In this procedure small amounts of the preferred local anaesthetic are injected directly into the lower portions of the spine so as to block the nerves that go to the organs and areas involved in childbirth. There were reports of hundreds of thousands of cases in which women had given birth to babies under caudal analgesia without feeling pain.

The procedure is technical and requires special training which usually calls for the continuous attendance of a physician or a nurse especially trained in the technique. Childbirth with this technique must be conducted in a hospital. The tendency was more and more for women in the United States to have their babies in hospitals. Estimates indicated that more than 85% of white women had their babies in hospitals in 1946 and in most hospitals there were specially developed sections devoted to obstetrics.

Estimation of Safe Period by Temperature Record.—Studies made on the function of menstruation and ovulation indicated that a woman can determine definitely the time when ovulation occurs by taking her temperature each morning and carefully recording it. The temperature is taken by mouth, using an ordinary fever thermometer, each morning at a certain time before food or drink is taken into the mouth. The temperature is carefully recorded on a suitable cross-ruled chart. By this technique it becomes possible to establish a period of from three to five days in which there is maximum fertility. During the remaining time of the month there is almost certainly sterility. When the temperature chart is followed, there is a line which goes along evenly until just before the time of ovulation. The line rises about one day beforehand and then falls suddenly the next day. Then it rises for two more days until it reaches a base line along which it continues until the next preliminary rise before the next ovulation. The period between the first rise until the final rise—namely, a period of three to four days—is the period of maximum fertility. During this period, conception following intercourse is most likely.



Cold-room at Harvard medical school where products of fractionated human blood were stored. Already found useful for coagulation in surgery and as a control for shock, these products were explored for other medical applications

Antibiotics.—Associated with the introduction of the antibiotic drugs, new techniques used in obstetrics and some advances in obstetrical education, the mortality of women in childbirth dropped to an exceedingly low, and perhaps irreducible, figure. Indeed, secondary infection following childbirth became so well controllable that former proposals for isolated maternity hospitals, in which only patients absolutely free from infections or complications would be cared for, were abandoned.

Roentgenography.—Roentgenography developed as a valuable aid in obstetrics for determining the position of the child and the structure of the mother, for detecting with certainty the presence of pregnancy, diagnosing multiple pregnancy, verifying foetal death, determining the size of the baby, detecting deformities of the baby, estimating the size of the baby's head and determining many other similar facts.

Rh Factor.—In 1940 discovery was announced of a new factor found in the blood, known as the Rh factor. The presence of the Rh factor or of incompatibility in blood because of this factor may result in stillbirth or in a serious condition in the newborn child known as erythroblastosis. As a result of this discovery, many hospitals introduced routine examination of the prospective mother for the Rh factor. The suggestion was made for special procedures to be followed during delivery of the child in order to overcome the danger of death.

Eclampsia.—Determination of the cause of eclampsia continued to be the goal of investigators in the field of obstet-

rics. Control of this condition still depended on early detection of its onset with the application of methods for relieving the toxæmia. Most heroic of the methods of treatment was the removal of the unborn child.

Early detection of such symptoms as blurring of vision, swelling of the limbs or increase in the blood pressure may help to avert eclampsia. Pernicious vomiting may be a sign of danger.

Brain Haemorrhage at Birth.—Much attention has been given to the possibility of preventing haemorrhages in the brain of the child at birth. These methods include the administration of clotting substances such as prothrombin and vitamin K. Obstetricians, however, were convinced that good obstetrical practice was the most significant factor for this purpose. Especially important is the avoidance of excessive amounts of drugs, like pituitary extract, which produce violent, expulsive efforts in the muscles of the uterus. (See also GYNAECOLOGY and OBSTETRICS.)

Neuropsychiatry.—*Psychosomatic Medicine.*—Increased attention to the combined effects of the mind and the body in the production of disease led to the establishment of psychosomatic medicine as a specialty. Studies with this technique revealed the tremendous importance of mental factors in the causation of such conditions as ulcer of the stomach, dysenteries and colitis, disturbances of menstruation, asthma and headache. Psychosomatic techniques were introduced particularly into the practice of internal medicine, surgery and allergy. Investigators concentrated on the development of forms of psychoanalysis called "brief psychoanalysis" and requiring much less time for the determination of specific factors leading toward successful treatment.

Shock Treatment.—Continued experiments with shock treatment for mental derangement or mental depression resulted in the application of this technique for many mental conditions but particularly for depression psychoses. While investigators in some institutions preferred insulin shock and others preferred metrazol shock, the tendency seemed to be toward widespread use of electric shock.

The use of curare for producing muscular relaxation previous to the administration of convulsive shocks helps to avert fractures and other complications that occasionally develop during this type of treatment.

Lobotomy.—During the ten-year period, experiments were extended on the use of frontal lobotomy, a technique in which the skull is opened and portions of the frontal lobe of the brain are removed. Investigators reported success, particularly in cases of anxiety and emotional upsets. Most investigators, however, were inclined to the belief that this technique was extremely limited in its applicability.

The various techniques used for schizophrenia or dementia praecox revealed some success with a variety of methods in a limited number of cases but the specific cause and a specific method of treatment were not yet determined.

Narcosynthesis and Hypnoanalysis.—New methods of investigation for mental disturbances included the technique of hypnotism combined with psychoanalytic procedure and another technique in which sedative drugs of the barbituric acid series are given to the patient associated with the psychoanalytic procedure. Active hypnotism was also used to put patients into a mental state in which they would reveal through their replies to questions and through the confession technique the underlying causes of mental disturbances. As a result, many fears and anxieties associated with so-called nervous breakdowns in military service were determined. Preventive techniques were also developed leading toward proper conservation of a suitable mental

state in the aviator, the infantryman, as well as the industrial worker who is subject to special stresses.

Electroencephalography.—The so-called brain wave machine was utilized in the study of a variety of mental disorders. By the use of this device it was shown that more than 50% of the members of the immediate family of epileptics are likely to have abnormal traces in the brain wave machine. The device was found of great value in the investigation of a great variety of mental disorders as well as convulsive disorders of the nervous system.

Group Psychotherapy.—In the practice of neuropsychiatry group techniques were developed for application to improving the emotional and mental status of great numbers of people at one time. (See also PSYCHIATRY.)

Venereal Diseases.—The progress of the campaign against the venereal diseases was greater during the decade 1937-46 than in any previous period in the history of medicine. The Kahn test, the Wassermann test and similar procedures were standardized so that the diagnosis of venereal disease could be made with relative certainty. Every soldier in the United States army was given a Wassermann test. The incidence of syphilis for the general population was revealed to be about 10 per 1,000 persons. Syphilis, however, was far more frequent among the Negro than among the white population. The passing of laws controlling prostitution helped to control to some extent the spread of venereal diseases among the armed forces. Relaxation of such restrictions following the end of the war resulted in a sharp upturn in the total amount of venereal infection. New techniques for the treatment of gonorrhoea and syphilis, however, indicated the likelihood, for the first time, that these diseases might be eliminated as typhoid fever and other infectious conditions had already been brought under control.

Syphilis.—Extensive experimentation with intensive methods of treatment yielded information of vast importance for prompt recovery from syphilis. At first continuous intravenous administration of arsphenamine combined with the use of bismuth was tried, but dangers to the tissues of the body and serious reactions led to virtual abandonment of this method. Indications became clear that syphilis of the nervous system associated with the occurrence of locomotor ataxia and general paresis might be controlled through various forms of treatment. Control of such conditions began with the administration of tryparamide, an arsenical, and was followed by the use of inoculation with artificial malaria or relapsing fever and still later by the application of heat through fever cabinets.

When penicillin was first discovered, investigators in the U.S. public health service tried its effects on syphilis and indicated the possibility of checking the infectiousness of syphilis by this means. Experimentation in the armed forces resulted in standardization of techniques for the treatment of syphilis with penicillin and determination of the proper dosages for the giving of penicillin either intramuscularly or by direct injection into the veins. Thus it became possible to stop the infectiousness of syphilis in a short time and to bring about probable cure of syphilis in seven days. This was in great contrast to the former period of three or four years for the application of arsphenamine.

At the end of the decade, it was still too early to determine the completeness of the cure, but the indications were that this method of treatment could stop syphilis.

In early syphilis involving the nervous system the methods used may include penicillin combined with the use of the arsenicals and heat treatment. Especially valuable was

the application of penicillin controlling congenital syphilis; this became the method of choice.

Gonorrhoea.—New methods of treatment of gonorrhoea involved immediate application of sulfathiazole, effective in the majority of cases in controlling gonorrhoea in from 24 to 48 hours. Penicillin was also found to be effective against this organism, and the use of penicillin by the injection technique became a fairly certain method of cure.

These techniques were especially valuable in preventing the secondary complications of epididymitis, infection of the fallopian tubes in women and more remote complications like gonorrhoeal arthritis and gonorrhoea of the spine.

In U.S. army camps attempts were made to give sulfathiazole tablets to soldiers going on leave as a means of prevention of gonorrhoea. (See also VENEREAL DISEASES.)

Cancer.—Research on cancer during the decade was devoted particularly to the discovery of substances called carcinogenic, which have the power either to initiate or stimulate the excessive growth of cells of the body. A great variety of substances were included under this category as well as forces of the type of the X-ray and radium. These materials, which include tars, derivatives of tars, some of the vitamin-like substances and some glandular extracts, were tested as to their effects on the growth and metabolism of the cells which showed wild and unrestrained multiplication.

Cancer of the prostate gland and cancer of the testis in men were apparently benefited by the use of large doses of the female sex hormone stilbestrol. Similar experimentation indicated some success in controlling the spread of cancer of the breast and of the ovary in women, giving in this instance the male sex hormone. The female sex hormone was also found to be of value in preventing the spread of cancer of the prostate or testis to the bones.

Cancer of the stomach, considered among the most fatal of all forms, was progressively overcome by utilizing new techniques for early diagnosis. These involved particularly the use of the X-ray and of the gastroscope, a device for looking at the interior of the stomach and photographing its walls. If cancer of the stomach is discovered sufficiently early, modern surgical procedures permit removal of portions, if not all, of the stomach with recovery of the patient.

Cancer of the lung was also being controlled by surgery, in some instances with removal of a lobe or of the entire lung. The application of new techniques in surgery of the chest offered about a 60% chance of saving life in a condition formerly considered invariably fatal.

New techniques in the radiation of cancer tissue included the development of the cyclotron, providing 3,000,000 volts. The General Electric company reported the building of a cyclotron that would produce 200,000,000 volts. Of cancers treated with neutrons produced by the cyclotron some apparently showed improvement in three months, although in 20% of the cases the tumours were not affected. Neutron particles were thought to be more destructive of cancer tissue than equivalent amounts of radioactivity produced by the X-ray.

Attempts to control cancer by long continued refrigeration indicated that freezing inhibits cancer growth but at the same time stops all of the other activities of the body, so that the human being is in a state of hibernation. Continued experimentation with this technique failed to substantiate early evidences of possible value.

An unusual technique for removing superficial cancers

including a method by which zinc chloride, used as a caustic paste for destroying cancer cells, is made the basis of a substance which fixes the cancer in the tissues and then permits surgical destruction of the cancer under the microscope.

The development of radioactive isotopes permitted experimentation with various radioactive substances which, injected into the body, travel to the cancer tissue and carry radioactivity directly to such tissue. Radioactive iodine was used particularly in attacking cancer of the thyroid gland and metastases from such cancers. (See also CANCER.)

Glands.—Various epochs in medicine are related to the lines of interest in specific aspects of medical study or specific systems and functions of the human body. The glandular period probably received its maximum impulse with the discovery of insulin by Banting and its use in overcoming diabetes. Previously, adrenalin from the adrenal glands and thyroxin from the thyroid gland had been isolated. These measures opened up a new series of studies leading to the use of liver extract against pernicious anaemia. Once the glandular epoch began to develop, new experiments were made relative to the isolation of a half dozen or more hormones from the pituitary gland, a whole range of hormones from the ovary and testis and a number of hormones from the wall of the stomach, from the kidney, from the heart and the liver.

Interesting experiments have been mentioned involving the injection of the male sex hormone into women to control cancer and of the female sex hormone into men for the same purpose. The use of the male sex hormone in a nursing mother will stop the flow of milk. Among other discoveries in relation to the female sex hormone was the way in which it can work together with insulin to keep down blood sugar in diabetes. Particularly important was the use of both male and female sex hormones in the period called the climacteric, when the sex glands begin to cease their active life and to atrophy.

An extract from the adrenal gland cortex, known as cortin, was found to be useful in treatment of various deficiencies related to that gland. A substitute for the adrenal gland hormone prepared synthetically and known as desoxycorticosterone was found to have special value in shock and also in the treatment of various conditions in which muscular weakness was a prominent symptom.

Significant also were researches which determined the presence in the kidney of a substance called renin, which reacts with a substance from the blood known as angiotonin to raise the blood pressure. Several hormones alleged to have influence in lowering the blood pressure were under investigation. These experiments derived from the work of Harry Goldblatt, who tied off the circulation of blood to the kidney and thus showed that some substance retained from the kidney in the body was related in some instances to the presence of high blood pressure.

The ovaries produce internal secretions necessary for the proper functioning of the uterus both in the normal life of the woman and in relation to childbirth. Internal secretions from the ovary determine cyclic changes in the vagina and in the cervix and are also related to the growth of the mammary glands. The ovary also gives off hormones, which in turn regulate the development of hormones by the pituitary gland, and there is a close interrelation between these glands. The anterior pituitary gland gives off a hormone which induces growth of the graafian follicles of the ovary. These follicles secrete the oestrogenic hormone, which brings about the changes that take place in the vagina and uterus during menstruation. Research by

chemists and physiologists yielded much new information regarding the oestrogenic hormones. The oestrogenic substance is produced in large amounts during pregnancy. Alpha oestradiol is considered the most potent of all the known oestrogens. These substances are given by injection, in ointments and by mouth and for a variety of conditions. The oestrogens are carcinogenic when given experimentally to animals which have an inherited sensitivity to the development of cancer of the breast. The corpus luteum, which occurs in the ovary after growth and elimination of the egg cell, has a hormone which stimulates growth of the breasts and relaxes the muscle of the uterus. This is known as progesterone. One of its uses is for the prevention of habitual abortion. Oestrogenic substances are used also for functional bleeding with excessive flow in women. (See also ENDOCRINOLOGY.)

Otolaryngology.—Conspicuous among the developments in the field of otolaryngology during the decade was the announcement of an operation known as the fenestration operation for otosclerosis or progressive loss of hearing. The procedure, known for some years, had always failed until Dr. Julius Lempert of New York City devised new instruments and new improvements in technique. By 1946 many thousands of operations had been performed in the United States, and great numbers of people previously condemned to permanent loss of hearing had recovered all or considerable portions of their ability to hear at various levels.

Continued research into the cause and pathology of otosclerosis led to studies along the lines of improved nutrition to overcome deficiencies in the field of the proteins and vitamins, particularly with an indication that detection of such deficiencies early in the course of loss of hearing might be helpful in arresting the progress.

Outstanding also in this field was the development of hearing aids to a quantity and quality never before achieved. Estimates indicated from 5,000,000 to 10,000,000 persons in the United States with hearing loss. New hearing devices were developed by the methods of mass production, the prices making them available to persons of moderate means.

Research in U.S. army medical centres involving the rehabilitation of soldiers who lost their hearing due to the noise and concussion of high explosives yielded excellent results brought about by combined psychologic approach with the application of hearing devices and teaching in the methods of the proper use of such devices.

As already mentioned, the operation for mastoiditis became less frequent after the prevention of secondary infection of the mastoid following infection of the nose and throat. The early use of the antibiotic drugs prevented extension of infection from the middle ear to the mastoid. In the same way secondary infection of the large blood vessels in this area was avoided, and in some instances when it did occur, it was controlled by the antibiotic drugs. These secondary infections of the blood vessels close to the brain formerly were invariably fatal.

Plastic operations were developed for the loss of the ear or for portions of the ear, and excellent plastic operations for changing the shape and position of protruding ears became more generally available.

The treatment of infection of the sinuses was advanced through investigations which indicated the great frequency of sensitivities to various substances as one of the major factors in the development of various forms of inflammation and infection of the sinuses. New operative procedures were developed for the drainage of the sinuses. Combined approach to infection by the use of the X-ray,

radium and antibiotic drugs led to the control of many cases of chronic infection and inflammation of the frontal, maxillary and ethmoid sinuses. (See also DEAFNESS.)

Ophthalmology.—Among the most serious of conditions affecting the eyes had been glaucoma, a condition in which there is increased tension in the eyeball caused by failure of proper drainage of fluid from the eye. Several new surgical procedures were developed leading to permanently satisfactory results. A South American investigator developed a technique by which injection of a drug deep into the eyeball yielded lessening of the tension within the eye. Late in 1946 announcement was made of the use of a new drug called di-isopropyl fluorophosphate, with the special quality of lessening the pressure within the eye. If continued experimentation with this drug confirmed its virtues, a tremendous step would have been made for the control of one of the most serious and permanently disabling conditions affecting the eye.

As a result of experiences in World War II, plastic substances were used for the creation of artificial eyes, and extensive improvements were made in the provision of such materials. New operative procedures were developed to permit the tissues to move the eye so that there is co-ordination with the good eye.

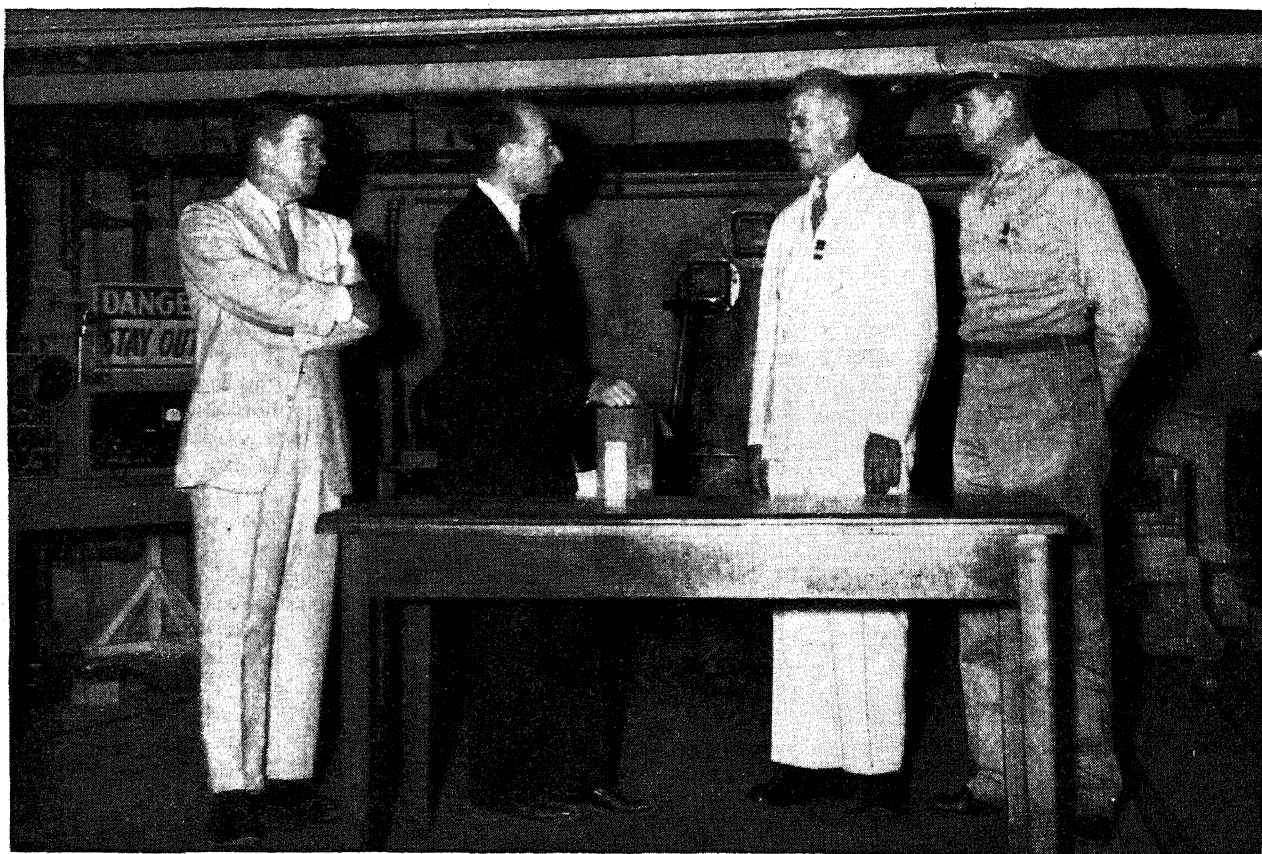
Similar improvements were made in the development of contact lenses, which take the place of ordinary spectacles. The improvements in the contact lenses and in the materials used between the lens and the eye in order to prevent irritation resulted in widespread application of these materials to cases of disturbed vision.

New studies were also made relative to a disturbance of vision related to the various planes in which objects appear. The complaint is known as aniseikonia. Recognition of this disturbance of vision as a special form and the provision of proper corrective lenses resulted in controlling a good many cases of unexplained headache as well as various nervous conditions related to disturbances of the vision.

Conspicuous in the attack on diseases of the eye was the application of the antibiotic drugs to the control of trachoma, a form of inflammation of the conjunctiva recognized as caused by a virus. This is one of the few virus conditions that yielded to the antibiotic drugs. Similarly, tuberculosis of the eye was found to yield to streptomycin, and thus another cause of visual difficulties was brought under control.

New operative procedures were developed for detachment of the retina. (See also EYE, DISEASES OF.)

Physical Medicine.—Although such techniques as the use of massage, hot baths, exercise and controlled motion were first described by Hippocrates hundreds of years before the beginning of the Christian era, the decade 1937-46 witnessed a notable revival of such methods and the development of improvements in techniques and materials. The National Foundation for Infantile Paralysis and the Baruch foundation devoted millions of dollars to extension of education in physical medicine and to the training of technicians. The claims made by Sister Elizabeth Kenny relative to the value of hot packs and muscle re-education in the treatment of infantile paralysis served as a stimulus to further studies. Extension of the field of physical medicine resulted also from its widespread use in aiding the rehabilitation of men wounded in World War II. Thus soldiers who had suffered injuries to the spinal cord with paralysis of the limbs were brought to maximum physical restoration by the application of physical medicine, by the



First sale of radioactive isotopes for use in medical research took place at Oak Ridge, Tenn., when Dr. E. V. Cowdry (second left), director of a cancer hospital in St. Louis, Mo., was sold a millicurie of Carbon 14 on Aug. 2, 1946. The isotopes were to be used as tracers in studying living cell reactions

use of prostigmine to lessen spasticity and by the application of nerve-muscle re-education. Similar methods yielded a much higher rate of recovery in patients paralyzed as the result of infantile paralysis or meningitis.

Much interest attached to improvements in apparatus for providing ultraviolet rays, useful not alone in the prevention of rickets and in bringing about suitable mobilization of calcium in the body but also for sterilization of air in schools, hospitals and barracks.

New devices were developed for the application of the fever treatment, and heat cabinets were applied particularly in the control of infections with syphilis and gonorrhoea.

Physical medicine included also extensive improvements in the roentgen ray and in the application of radium and of radioactivity through the radium emanation in the form of radon. New devices such as the cyclotron and the betatron were employed to create radioactive isotopes, and by these techniques radioactivity could be carried into portions of the body not previously approachable by this method.

Improvements in the field of rehabilitation involved the development of special techniques for vocational therapy, occupational therapy and group psychotherapy.

New Techniques.—The progress of medicine is greatly dependent on new discoveries in apparatus and methods which, once conceived, permit great numbers of investigators to search along pathways not previously open.

The perfection of the electron microscope permitted the photographing of infinitesimal bodies like the viruses, and from observations in such photography came the isolation of several viruses not formerly known. Accurate observations also permitted statements as to the sizes and shapes of viruses and their relationship to each other.

The technique developed by Ernest W. Goodpasture for

the cultivation of viruses, utilizing the fertilized embryo chick, permitted not only the isolation of a number of viruses in pure form but also the preparation of vaccines which could be inoculated and thus cause the human body to develop protective substances against infection with such viruses.

The development of the radioactive isotopes, coupled with the use of the Geiger counter, made possible the tracing of various elements on their paths through the body and by their selective location in specialized tissues the determination as to the existence of metastases from cancers.

The use of electric amplification of sound led to the development of a device for locating portions of steel or missiles or other foreign substances in the tissues of the body and thus saved the lives of many men wounded in war.

The application of the electric eye principle led to the development of a cane to be used by the blind which would indicate to the blinded person carrying the cane the presence at various distances of objects of various sizes.

A combination of a chemical and physical principle led to the development of a light to be placed on the ear of an aviator which would indicate by the intensity of the light the amount of oxygen circulating in the blood and thus permit the giving of oxygen when flying at dangerously high altitudes.

These were but samples of thousands of technical discoveries made in other fields and applied to medicine.

Social Medicine.—Improvements in medical techniques resulted in considerably increasing the costs of high quality

medical service. Medicine, formerly practised by an individual physician with the materials that he could carry in a bag, now required hospitals for the application of new methods involving the use of such devices as the basal metabolic apparatus, the roentgen ray, the electrocardiograph, the electroencephalograph and many other new instruments. By the application of new methods and by early ambulation rather than prolonged bed rest, the relative stay of the patient in the hospital was lessened, but visits to the hospital were far more frequent than formerly.

In order to meet the increasing costs of medical service and to secure better distribution, many nations instituted the system of compulsory insurance against the costs of sickness. This method did not seem to be easily applicable to the U.S. democratic system of government. As a result, the development of voluntary insurance against the costs of hospitalization and of medical care was exceedingly rapid. By the end of 1946, voluntary insurance against the costs of hospitalization had risen in the number of persons insured to more than 30,000,000. Insurance in private insurance companies against the costs of sickness and surgery formerly demanded premium rates so high that it could be carried by only a small percentage of the population. Application of mass sale of insurance against the costs of sickness and surgery and great improvement in medical science which made the accumulation of actuarial records possible resulted in the development of several types of insurance which grew at an exceedingly rapid rate. These included group insurance sold by the private insurance companies, which by 1946 covered in whole or in part the sickness and surgical costs of some 23,000,000 industrial workers. New techniques developed through the county and state medical societies similarly covered, at the end of 1946, some 5,000,000 to 6,000,000 persons.

The representatives of the mine workers were successful in securing an arrangement whereby employers established a health and welfare fund, representing a certain percentage of the cost of each ton of coal, this health and welfare fund being administered by joint committees of the miners, the mine owners and the public and providing free choice of physician and free choice of hospital by the miner and his family.

Toward the end of 1946 the American Federation of Labor announced its desire to establish a similar type of fund for all members of unionized labour embraced in the federation.

The congress of the United States passed legislation for the use of federal funds in the building of hospitals and health centres and toward developing a co-ordinated use of medical facilities. Thus there seemed to be developing in the United States a system for the provision of medical and hospital care which was definitely related to the U.S. democratic system of government. (See also ALLERGY; BACTERIOLOGY; BIOCHEMISTRY; BIRTH CONTROL; CHEMISTRY; DIETETICS; DRUG ADMINISTRATION, U.S.; EPIDEMICS AND PUBLIC HEALTH CONTROL; HOSPITALS; INDUSTRIAL HEALTH; MILITARY MEDICINE; NERVOUS SYSTEM; PHYSIOLOGY; PUBLIC HEALTH ENGINEERING; REHABILITATION OF THE DISABLED; TUBERCULOSIS; UROLOGY; VETERINARY MEDICINE; X-RAY. See also articles on specific diseases.)

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Mediterranean, British Possessions In The

See CYPRUS; GIBRALTAR; MALTA.

Meighen, Arthur

Meighen (1874–), Canadian politician, was born June 16 at Anderson, Ont. Raised on a farm, he was educated at St. Mary's Collegiate institute, Caledonia, Ont., and at the University of Toronto. After teaching at Collegiate institute and in Winnipeg, he was called to the bar at Winnipeg in 1903. He then practised law at Portage la Prairie, Manitoba. First elected to the Canadian house of commons in 1908, he was re-elected in 1911, 1913 and 1917. He was solicitor general in 1913, secretary of state for Canada from 1915 to 1917 and minister of the interior and superintendent general of Indian affairs in 1917. In 1918 he went to England with the prime minister, Sir Robert Borden, to attend the Imperial conference of that year. Meighen served as premier of Canada from July 1920 to Dec. 1921, and again from July to Sept. 1926, until he was defeated in the general election. In Feb. 1932 he was chosen minister without portfolio in the Bennett cabinet, and was named leader of the senate. Selected to lead the Conservative party in 1941, he lost his seat in the house of commons in Feb. 1942 and resigned as leader of his party the following December.

Melbourne

Capital of the state of Victoria, Australia, Melbourne had in 1946 an estimated population of 1,184,000 (greater Melbourne area). During 1937-46 its civil activities expanded considerably. In 1939 the Melbourne city council, a corporation with an annual revenue of £A2,000,000, staged a £12,500 pageant which emphasized national progress, unity and artistic achievement. After World War II civic projects were revived and enlarged. The council and the Victorian state government advanced proposals for the construction of an eight-acre cultural centre in the heart of the city, to house a national art gallery, music hall and auditorium, at an estimated cost of £2,000,000. A scheme for a permanent state orchestra and an annual music festival and carnival were proposed. More attention was given to Melbourne's celebrated parks, gardens, reserves and sports fields (total area 1,626 ac.). Maintenance charges rose from £78,000 in 1937 to £117,000 in 1946.

Early in the Pacific war the commander in chief, Southwest Pacific, General Douglas MacArthur, had his first headquarters in Melbourne, where large numbers of U.S. service personnel were based. Later, Admiral Sir Bruce (afterward Baron) Fraser, commander in chief of the British fleet in the area, established an administrative staff in Melbourne. Victoria barracks (defense headquarters), Melbourne, it was announced, might become one of the most important defense centres in the British commonwealth. Established there in 1946 was a British-Australian-New

128 Zealand-Indian defense team of the highest rank called "joint chiefs of staff in Australia." (A. R. MN.)

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Mellon Collection

See ART GALLERIES AND ART MUSEUMS; SMITHSONIAN INSTITUTION.

Melons

See VEGETABLES.

Memel Territory

Memel (Lithuanian Klaipeda) became provisionally a part of the soviet union in 1945. It is a long strip of land on the right bank of the Niemen (Nemunas) river on the frontier of East Prussia and Lithuania. Area, 1,100 sq.mi.; pop. (official estimate of 1939), 155,000. According to the German census of 1910 this region had a population of 140,766, of whom 71,191 spoke German as their mother tongue, 67,345 Lithuanian and 1,970 were bilingual. The Germans greatly predominated in the town and port of Memel (an old Hanseatic trading settlement); the Lithuanians predominated in the rural districts. Memel, the chief town, with modern wharves and ice-free throughout the year, is the main port of Lithuania and important also for the export of Polish produce.

Memel Territory, formerly a part of Germany, was ceded by the Versailles treaty to the four principal Allied powers who intended to establish an international administration. In Jan. 1923, local patriots and irregular Lithuanians seized it from the hands of the French administrator, and in 1924 the powers agreed it should be part of Lithuania with large autonomy and subject to certain conditions to regulate the use of the port by both Lithuania and Poland. According to the terms of a convention worked out by a commission with a U.S. head, Norman H. Davis, Memel Territory was to have a governor appointed by Lithuania; an elected chamber of representatives (*Landtag*) of 29 members and a directorate of five, the president of the directorate being appointed by the governor, and the other four directors appointed by the president. Unfortunately, racial hatred between German Memellanders and Lithuanians prevented the smooth working of these arrangements. At first Lithuanians dismissed German workers, expropriated their land and tried many for treason. The national socialists turned the tables in 1938 by winning 25 of the 29 seats in the diet. On March 22, 1939, Germany demanded that the territory be annexed to the German reich, and the next day Adolf Hitler landed from a battleship to take possession and began erecting fortifications. Russian armies occupied the territory early in 1945 and deported most of the German population to Russia for forced labour or to Germany. By the Berlin conference of July 1945, it was agreed that the soviet union should administer provisionally the territory until the boundaries of Germany were finally settled. (S. B. F.)

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Mental Diseases

See PSYCHIATRY.

Menzies, Robert Gordon

Menzies (1894–), Australian statesman, born Dec. 20, 1894, was educated at Grenville college, Ballarat, at Wesley college, Melbourne and at Melbourne university. He practised law in Victoria, entering the Victorian legislative council in 1928 and the provincial assembly the following year. From 1932 to 1934 he was attorney-general and minister for railways in the cabinet of Victorian premier Sir Stanley Argyle, and for a short time in 1934 was acting premier. In that year he was appointed attorney-general and minister for industry in the dominion cabinet of Joseph A. Lyons. Upon the death of Lyons in 1939, Menzies was elected leader of the United Australia party, and received his commission to form a cabinet. Immediately upon the outbreak of World War II on Sept. 3, 1939, Menzies' cabinet approved a declaration of war against Germany. The following month he re-introduced compulsory military training in Australia. In March 1940 he reformed his cabinet along coalition lines to include three members of the Country party. Menzies left Australia in Jan. 1941 to attend a series of conferences with Winston Churchill and members of the war cabinet on Australia's part in the war. He returned to Melbourne late in May to face a growing opposition in parliament, caused partly by the Libyan, Greek and Cretan defeats in which Australian troops had taken part, and partly by the Labour party's insistence that the prime minister remain in Australia and not return to London. Menzies resigned in Aug. 1941 and was succeeded by Arthur Fadden, in whose cabinet he remained as minister of defense co-ordination. He was again elected leader of the United Australia party in Sept. 1943.

Merchant Marine

See SHIPPING, MERCHANT MARINE.

Mercury

With a total world production of only 5,000 short tons a year prior to World War II, doubling during the war years, mercury had acquired a multiplicity of uses which gave it an importance far out of proportion to its bulk.

The problem of mercury supply during the war years was complicated on the one hand by the magnitude of the essential war uses, and on the other hand by the fact that normally two-thirds of the output had come from Italy and Spain.

Table I.—World Production of Mercury
(Short Tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Canada	—	—	—	77	268	518	845	368	—
Chile	—	2	—	—	50	86	97	45	?
China	66	21	187	129	248	180	130	114	?
Czechoslovakia	105	110	101	98	—	—	—	—	—
Germany	68	53	46	36	34	19	—	—	—
Italy	2,545	2,537	2,552	3,467	3,578	2,884	2,280	1,330	1,520
Mexico	188	324	280	443	879	1,233	1,076	989	625
South Africa	—	—	—	—	8	22	45	45	32
Spain	1,078	1,574	1,365	1,984	3,286	2,747	1,815	2,620	1,523
United States	627	684	708	1,436	1,707	1,932	1,973	1,432	1,169
Total	5,059	5,700	5,510	7,980	10,450	9,880	8,740	7,220	5,130

Normally, the United States had been a relatively small producer of mercury. In spite of the handicap of low-grade ores, the domestic mercury industry was expanded to meet war demands, leaving such imports as could be secured, chiefly from Canada and Mexico, to be accumulated as stocks to cover a possible emergency shortage. Between 1937 and 1943 the domestic mercury output in-

creased more than threefold. Production declined heavily after the main peak of demand had been passed in 1943, but in 1945 it was still almost double the 1937 figure.

Direct war uses for mercury included such items as fulminate for explosives, anti-fouling paint for naval use and pharmaceuticals for the armed forces; items contributing indirectly to the war program were agricultural disinfectants and fungicides, the mercury used indirectly in various processes for producing chlorine, caustic soda, acetic acid and other chemicals and the large amounts used in electrical apparatus and industrial control instruments. The large increase in mercury consumption in 1945 was largely because of the development of a new type of dry cell using mercury as an active ingredient, large numbers of which were required for tropical use by the armed forces.

After the close of World War II this new cell was adapted for certain civilian uses.

Table II.—Data on the Mercury Industry in the United States
(Thousands of pounds)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Production	1,255	1,366	1,416	2,871	3,414	3,864	3,947	2,864	2,338
Imports	1,438	180	266	13	588	2,960	3,633	1,486	5,215
Spain	535	95	198	3	8	—	—	—	4,210
Italy	747	84	26	—	—	—	—	—	—
Mexico	117	—	43	10	521	2,289	2,239	1,289	825
Canada	—	—	—	—	60	562	1,184	119	131
Exports	35	54	92	731	197	593	1,158	57	208
Available supply .	2,658	1,491	1,590	2,153	3,805	6,231	6,429	4,294	7,345
Consumption . . .	—	—	—	2,037	3,405	3,777	4,142	3,260	4,856

In response to war demand mercury production was developed in British Columbia, and in 1943 Canada was the world's fifth largest producer. With the cessation of war demand operations were suspended, pending the disposal of accumulated stocks.

The normally small output of Mexico was expanded more than tenfold, and during 1942–44 Mexico was the largest source of supply for U.S. imports. (G. A. Ro.)

Meretskov, Kirill Afanasjevich

Meretskov (? —), Russian army officer, was in command of the Leningrad military district at the outbreak of the Russo-Finnish war in Nov. 1939, and was in part responsible for successful operations against the Finns. After the Germans attacked the Soviet Union in June 1941, Meretskov was charged with maintaining the defenses outside the Leningrad area, and in Jan. 1943, together with Marshal Leonid Govorov, he lifted the land blockade of Leningrad. In the early winter campaign of 1943–44, Meretskov's forces on the Volkhov front participated in the Russian operation which crushed Wehrmacht defenses about Leningrad and captured Novgorod to the south. In the summer campaign of 1944, Meretskov was assigned to the Karelian front; again with Marshal Govorov he launched the drive on June 10 that smashed through the Finnish defenses and compelled Finland to sue for peace. Meretskov was awarded the Order of Suvorov in 1944, and in October he was elevated to the rank of marshal. In Aug. 1945, when the Soviet Union sent three of its finest armies into Manchuria, Meretskov commanded the 1st far eastern army.

Merit System

See CIVIL SERVICE.

Merrill, Frank Dow

Merrill (1903–), U.S. army officer, was born Dec. 4, 1903, in Woodville, Mass. He was graduated from West Point in 1929, and was then assigned to study at the Massachusetts Institute of Technology, where he received

his B.S. degree in 1932. After a period as an instructor at Fort Riley cavalry school in 1935, he was sent to Japan in 1937. He was in Rangoon on a mission for Gen. Douglas MacArthur when war broke out on Dec. 7, 1941. He stayed on in Burma with Gen. Joseph W. Stilwell and participated in the retreat to India. In 1942 and 1943 Merrill helped Stilwell map plans for the reconquest of Burma. In early 1944 Merrill, then a brigadier general, was given command of specially trained jungle troops, later called "Merrill's Marauders." These forces showed remarkable adaptability to jungle warfare and defeated the Japanese at Shaduzup and at Myitkyina in Burma. Merrill took ill during the campaign in April 1944 and was flown back to a hospital in India for treatment. In Aug. 1944 he was relieved of his command. From Dec. 1944 to July 1945 Maj. Gen. Merrill acted as deputy commander of U.S. forces in the India-Burma theatre of operations, and in Jan. 1946 he was assigned to the western defense command under Gen. Stilwell.

Meson, Mesotron

See PHYSICS.

Metallurgy

During World War II, emphasis in metallurgy was on production rather than on methods, and new developments in metallurgical procedure generally were not attempted unless they promised to lead to the solution of a vexing production problem. Hence, many of the advances accomplished were concerned with matters that for security reasons could not be made public at the time. With the war over and the veil of secrecy lifted, many new and striking developments in metallurgical detail, but relatively little about changes in fundamental process metallurgy, were revealed.

Although many of the new processes and products were to be adapted to peacetime industry, others would disappear, having been useful only for the time or need for which they were devised. The same comment applied to many types of new equipment; some could be used directly; others could be adapted to similar peacetime uses; but some were of about as much use as a worn-out obsolete bomber—not because of any lack for which they were designed, but because that use no longer existed.

Investigators sent into axis countries after the close of the war reported their findings with respect to metallurgical developments during the war years.

While some of the methods reported could be adapted for use in peacetime industry, much of the work done was concerned with the best utilization of low-grade materials or substitutes, made necessary by the shortage of raw materials.

Developments worthy of mention were so numerous that it was difficult to catalogue them, let alone discuss them, however briefly.

Aluminum.—Increased war demand brought no significant changes in the basic metallurgy of aluminum, but many new alloys were developed, and war uses led to new applications of the metal.

Considerable advance was made, however, in the development of processes for utilizing low-grade ores for the preparation of the pure alumina required for the production of the metal.

Antimony.—Expansion in smelting capacity led to several new types of plant operation: a process for the recovery of antimony and mercury from livingstonite; a process involv-

ing electric furnace treatment of the ore; and a process of leaching and electrolytic recovery. The addition of antimony to 18-8 and plain chromium stainless steels was reported to reduce corrosion by hydrochloric, sulphuric and acetic acids.

Beryllium.—Most of the development of commercial uses of beryllium alloys came during the decade 1937-46, with progress greatly accelerated by war uses, especially in aeroplane engine and instrument parts. The metal was also mentioned in connection with work on the atomic bomb, but to what extent and for what purpose was not reported.

Bismuth.—The most important change in the applications of bismuth was increased use in low melting point alloys, as aids in the forming and shaping of metals. Addition of small quantities of bismuth to aluminum alloys and to stainless, manganese and carbon steels improves machinability.

Boron.—As an addition in low alloy steels, small percentages of boron impart physical properties, especially hardness, that would require much greater amounts of other metals; in aluminum permanent mould castings, boron refines the grain structure and produces round cavities instead of angular ones, without affecting corrosion characteristics or heat treatment, but at the expense of greater brittleness and some lowering of physical properties.

Cadmium.—The outstanding feature in connection with cadmium was its use to control the rate of action in the pile for the conversion of uranium to plutonium.

Chromium.—Marked studies were made in the development of new chromium alloys resistant to oxidation and corrosion at high temperatures, for use in the jet-driven aeroplane and gas turbine. The formation of a corrosion resistant surface on ordinary steel by heating for an extended time in contact with chromium powder served to conserve high chromium stainless steels in uses where only surface resistance was required.

Cobalt.—The loss of the Belgian plant with the German occupation led to the establishment of smelting facilities at Niagara Falls, U.S., for treatment of the Belgian Congo ores along with those from Canada.

Columbium.—Improved processes were developed for the production of metallic columbium, but few uses had been found for the metal by the end of the decade.

Copper.—No striking advancements were made in copper metallurgy, but many improvements were recorded in plant procedure, life and capacity of equipment, and in the development of new products.

Gold and Silver.—Metallurgical progress in the United States was throttled by the closing of the mines during the war years, but some advances were made in applications. Thousands of tons of silver were loaned by the U.S. treasury, for use in conductor bars in electrolytic aluminum and magnesium plants, to conserve copper. Industrial uses expanded greatly, especially for silver.

Iron and Steel.—New blast furnace construction for war needs did not involve any striking new advances in metallurgy, but they did emphasize the trend toward increased size and capacity; several had a rated capacity of 1,200 tons per day, and some produced at more than rated capacity.

In bessemer steel, the outstanding development of the decade was the use of the photoelectric cell to give precise control of the blowing of the bessemer converter by following the condition of the flame; this procedure resulted in a more uniform product and advanced previous

knowledge of the oxidation process and of the absorption of nitrogen by the bath.

Large quantities of brass were saved by the development of a steel cartridge case for artillery ammunition. After the original development in the United States, the steel case was adopted by Great Britain; Germany also used steel cases.

When the growing demand for alloy steels strained the supply of alloying metals, a series of low alloy compositions, known as national emergency steels, was devised and the substitution of these steels for high-alloy steels in all possible uses conserved large amounts of alloy elements.

Strenuous efforts were made to establish the production of sponge iron on a commercial basis but with little success beyond demonstrating that none of the processes tried could be profitably used except for very limited applications.

It was almost inevitable that the heavy production demands incident to World War II should bring a revival of interest in the use of dry blast as a measure for improving efficiency in blast furnaces, cupolas and bessemer converters. Experimental runs were made in blast furnaces in Germany, using enriched blast containing 26% oxygen, with an appreciable saving in costs, especially with low grade ores. Furnace output was increased and coke consumption was reduced.

A scheme for the classification and identification of inclusions in cast iron and steel was reported to the British Iron and Steel institute.

Lead.—In Canada and Australia, advances were made in blast furnace operation, particularly in the widening of the furnace. Changes were also made in bosh design, including a double set of tuyeres. One interesting new feature resulted directly from manpower shortage; lead pigs piled in cars for interplant movement usually were shifted so much that repiling was necessary before the usual forked truck could be used for unloading; the new procedure was to cast the metal in ten-ton blocks, for handling by crane.

In World War II, lead furnished more than ammunition. Storage batteries for submarines and mechanized land equipment were a major item. An almost fantastic procedure was the laying of an armoured lead pipe under the English channel, through which the gasoline supply for the invasion of Europe was pumped from Britain to the Normandy beach. Also the gasoline itself had been treated with lead tetraethyl to improve its performance in plane and truck engines. Lead protective shields played a significant part in handling the radioactive materials going into the construction of the atomic bomb.

Mercury.—A striking feature in the war uses of mercury was the development of a dry battery using mercury as an active ingredient, giving a cell with long shelf life in tropical temperatures. The new cell was adapted for use in hearing aids, and other applications were expected.

Magnesium.—The war expansion in the production of magnesium brought several new reduction processes to supplement the electrolytic method which had supplied the prewar output. Raw materials used were expanded even more broadly, to include magnesite, dolomite, bruceite, dry lake brines, sea water bitterns and raw sea water, in addition to magnesium chloride from well brines, the only prewar source. An improved process electroplated silver on magnesium as a protection against atmospheric corrosion.

Manganese.—Early in the decade 1937-46, the electrolytic production of manganese passed from the laboratory to the plant stage and by 1945 had expanded to an output

of the order of 2,000 tons a year, with two commercial plants operating, besides the large experimental plant of the U.S. bureau of mines. High cost still limited the use of electrolytic manganese to alloys in which low carbon content bars the use of ferromanganese.

Sodium.—Metallic sodium was used as a coolant for the valve stems of aeroplane engines, the metal being placed in a hollow stem, so that when melted by the heat, it could by convection and conduction carry the heat away from the head of the valve to the base of the stem, where it could be absorbed in the cooling jacket.

Tin.—Loss of smelting capacity in countries falling into axis hands, and transportation difficulties, necessitated the construction of a tin smelter in the United States, near Galveston, Tex. The substitution of electroplating for hot dipping in the production of tin plate resulted in a saving of from one-half to three-quarters of the tin formerly used for cans. Extensions in the facilities for detinning and recovery of tin from scrap and tin cans included the construction of plant capacity to handle 60,000 tons a year, recovering 1,970 lb. of scrap steel and 23 lb. of tin per ton. However, possible recoveries by detinning were reduced to a fraction of their prewar level, since a large proportion of the use of tin cans was already shifted to glass or other types of container, and a large share of the tin containers that were still considered essential were to be used in lend-lease shipments or sent to the U.S. armies abroad, with no recovery possible except for the small share left for use at home.

Titanium.—Most of the increased demand for titanium was for use in paint pigments, and not for metallurgical use. Processes for the production of metallic titanium of high purity were sufficiently successful to make promising the possibility of developing new uses for the metal.

Tungsten.—Demands for tungsten that greatly exceeded the supply led to the substitution of other materials, especially in the major use as high speed tool steel. The two chief measures were the use of molybdenum to replace part of the usual tungsten content, and use of sintered carbides of tungsten and tantalum.

Uranium and Plutonium.—By far the most outstanding metallurgical development of the entire World War II period resulted from the research leading to the production of the atomic bomb (*q.v.*). Scientists not only fulfilled the alchemist's dream of the transmutation of the metals, but went even a step farther and produced a new variety of uranium (U_{239}) and the entirely new metal plutonium—not in amounts requiring the microscope and spectroscope to detect them, but certainly in pounds, and possibly even in hundredweights. This accomplishment opened up such enormous future possibilities that in it on the one hand lay the seeds for the destruction of world civilization, and possibly even of the entire human race and the world itself, or on the other hand, the necessary impetus to bring nations into a sufficient degree of accord that they could dispense with war, while at the same time reaping a harvest of untold benefits from a force created primarily for destruction.

Vanadium.—Long used as a constituent in high strength alloy steels, vanadium entered the field of magnet steels, during World War II, in an alloy with iron and cobalt. It was reported that the Germans used vanadium as a substitute for tungsten in tool steel, and vanadium carbide to supplement tungsten carbide; vanadium was also used in high temperature alloys for jet propulsion engines and gas turbines.

Zinc.—The chief features in the metallurgy of zinc were increased output and recovery from retort smelting, largely

through attention to the character and sizing of the charge; further increase in purity of the product by electrolytic producers; progress in the improvement of the output and efficiency of vertical retorts; continued increase in popularity of the Waelz process; and extensions of plants for the electrogalvanizing of wire and sheets. The Republic Steel Company started electrogalvanizing operations on a large scale near Chicago producing zinc-coated strip in coils with a heavy plating sufficiently ductile to withstand fabricating operations.

Casting Methods.—An innovation in nonferrous technology was the substitution of rolling by a process of continuous casting, in which liquid metal is converted into unlimited lengths of rod or other shape of constant cross section. The method was particularly applicable to brass, copper, aluminum and magnesium, and was used to a limited extent with steel. The same procedure was applied to sheet and strip, but only to a minor degree by the end of the decade.

Where the number of pieces did not require conventional methods of forging, stamping and machining, investment or "lost wax" casting was applied for precision castings in limited numbers. The use of polystyrene and other styrol resins in the lost wax process was said to produce tolerances as low as 0.0002 in. Precision casting methods resulted in savings of metal, time, tooling costs, machining time and man-hours.

Die-casting machines grew in size and weight, and were being made with interchangeable pots and plungers, so that the machine might be adaptable to more than one type of alloy.

Metal Working.—Probably the greatest technological advances in the entire field of metallurgy were to be found in metal working, where not only the skilled efforts of engineers but also the native ingenuity of the workers on the production line combined to produce almost unbelievable savings in working time in a wide variety of mechanical operations. Methods were devised for precision forging of automotive gears, saving the time formerly required for machining. Machining operations, in general, were speeded up, with special attention given to the construction of combination machines which could perform a whole series of operations, applying the principles of the automatic screw machine to a highly complicated succession of different operations, such as the conversion of a rough casting into a finished aeroplane engine cylinder. The production of bombs was greatly improved by the use of spinning methods in forming the nose and tail parts.

Localized Hardening.—There were marked improvements in the methods of producing localized hardening—in particular areas of a part, or restricted to its surface—by the application of localized heating, either by flames directed on the area to be hardened or by the use of induction heating. The latter was particularly effective in generating the required temperature in the desired area before it could be spread to adjacent areas by conduction. High frequency induction heating also provided concentration of heat in a specific area for soldering and brazing. There was a marked lightening of the load in the regular heat treatment furnaces of plants using localized hardening.

Metal Cutting.—Diamond metal-cutting tools were made with three to seven cutting edges side by side around the contour of the tool, so that when one edge is worn dull, the next one can be brought into line with a minimum loss of time. Conventional methods for the flame cutting

of steel gave poor results with stainless steel, because of the high melting point of the chromium oxide formed. A novel method of overcoming this difficulty lay in feeding into the cutting flame a finely divided flux, which combines with the oxide and reduces its melting point. Another new application of flame cutting was in the cutting away of surface flaws in ingots or blooms, replacing the much slower chipping tool; carrying this procedure a step further, the old established methods of flame cutting were adapted to shape a rough form from a steel bloom, to replace a casting.

Welding.—Methods were developed, perfected and extended to new applications and metals. The construction of a welded all-magnesium aeroplane became possible, using sheets, extruded shapes and castings, and a modified arc welding process similar to the atomic hydrogen process, but using helium instead of hydrogen. Another development was the "stitching" of stainless steel sheets by special resistance welding machines. A new system of welding was introduced in which the usual welding rod was replaced by powdered metal and flux, fed into the flame through the tip of the torch.

Powder Metallurgy.—Starting with the consolidation of a metal powder by pressure and heat, there developed a well-established and rapidly-growing practice of powder metallurgy that had extended to the synthesis of a wide variety of ferrous and nonferrous products, had increased in size and complexity of form, and had expanded in range of composition and scope of application as the technique of production had progressed, until the new applications were relieving the load on the die-casting industry. At the same time they were expected to play a part in the solution of many problems involving compounding as well as forming, as applied to war production. Metal parts for many types of equipment for the armed forces were produced by powder metallurgy methods, with great savings in time, material and cost. One small part required by the navy was stamped out at the rate of 520 per min., while the time required for a more complicated piece was cut from 98 min. by conventional forming methods to a matter of seconds, using powder metallurgy. German metallurgists were reported to have perfected a method of producing high grade iron powder directly from liquid metal. Thousands of tons of the product were used in shell bands, with an increase of 20% in the life of the gun barrels, as compared with copper bands.

Metal Finishing.—Much difficulty had been encountered in the dipping or spraying of metal parts with heavy enamels and lacquers, caused by irregularity from flow of excess coating, necessitating discards or extra labour to remove the surplus; also much of the sprayed material was lost, as it could not be concentrated on the part. These troubles were overcome by spraying in an electrostatic field with the part grounded, which concentrated the spray in a thin uniform coating with little loss of the enamel, and with a considerable saving of time, both in application and in reworking faulty pieces. In some cases the speed was doubled, and the cost was reduced in the same proportion.

The use of radio-generated heating to fuse the tin coating of electrolytic tin plate resulted in great improvement in the product, and the ability to produce a thinner coating that was still impervious enough to serve the purpose. Electrolytic tin plate required only about half the amount of tin needed for the old style dipped plate.

An English process was developed for the coating of cast

iron with tin by a hot dipping procedure, giving a good bond and satisfactory smoothness and gloss.

Miscellaneous Features.—There were several new and interesting applications for low temperatures in the treatment of metals. Temperatures down to -100° F. were used for such processes as retarding the hardening of aluminum alloy rivets; relieving strains and stabilizing the structure of steels to obviate slow changes in dimensions (particularly important in gauges); forcing the completion of transition reactions not fully stabilized in the original treatment, to give increased hardness and life in machine tools; in making shrink fits of closefitting machine parts. For these applications mechanical refrigeration replaced cruder and more expensive methods using dry ice and liquid air.

The usual reasons for the use of air conditioning (*q.v.*) in industrial work continued to be improvement of working conditions or the stabilization of atmospheric conditions; the former to increase output and the latter to ensure uniformity of output. It was found to be advantageous to install air conditioning in plants producing certain highly finished metal parts, in order to avoid future corrosion from traces of perspiration left on the surface during handling. It was also used to eliminate minute differences in the size of machine parts caused by temperature changes; in some cases size tolerances were so narrow as to be disturbed by ordinary day and night changes of temperature in the shop.

One of the most interesting of the new metallurgical developments was the use in aircraft construction of a rivet with a hollow end, in which was embedded a small charge of explosive. These were used at points where the under side of the work was inaccessible for heading in the usual way. When the explosive was set off by heating the rivet head, the end was expanded and the rivet was set in place.

The familiar bimetallic disk used for many years as a control in electrical heating equipment was adapted for fire protection devices in war planes.

Inspection Methods.—One of the crucial problems in maintaining high speed production methods was that of speeding up the inspection procedure to keep pace with production. This difficulty was more pronounced in inspection for flaws than for proper dimensioning.

The X-ray, radiography, fluorescent light, ultrasonics, the electron microscope, and magnetic and photoelastic methods, and measurement of hardenability and machinability were among the newer testing processes which were finding new fields of use and broader application.

Methods were developed for detecting cracks, pores and other flaws, connecting with the surface; after rubbing the surface with a phosphor paste, and wiping the surplus from the surface, the flaws showed up by fluorescence under an ultraviolet light.

Inspection for internal flaws by X-ray (*q.v.*) was speeded up and put on a production line basis. In some cases photographic record was made of each piece, while in others only visual examination was made, viewing an image thrown on a fluorescent screen. One line of this kind produced a photographic record of six castings every 30 seconds, or at the rate of 17,000 per day. The scope of X-ray radiography was extended to 12 in. of metal by the use of a new 2,000,000 volt X-ray machine. X-ray diffraction methods were successfully applied in the nondestructive testing of the bond between an electrodeposited metal and the base metal, the investigation of electrodeposited alloys, and in studying the diffusion of indium plating into lead in aircraft bearings.

X-rays were used in a nondestructible gauging of the

thickness of metal parts not accessible for ordinary procedures, by comparing the density of a negative made under standard exposure with others from metal of known thickness. X-ray methods were also developed for the inspection of the setting of diamonds in tools, to guard against loss of diamonds, while another application measured the thickness of a sheet or plate of metal by the reflection of the rays from the back of the sheet.

Advances were likewise made in the application of radiography, since radium can be used with much less elaborate equipment than is required for X-rays.

On the market as early as 1941 were generators of ultrasonic waves, and several new applications were being tried out in the testing of metals for flaws, cracks, inclusions and voids. In addition to test procedures, another development that showed promise was the better dispersion of liquid alloys and of metal powders, and there were indications that these waves might help in the degasifying of metals and in the penetration of the hardening agent in surface hardening processes.

Although the entire commercial development of the electron microscope fell within the decade 1937-46, this instrument responded to the same conditions that brought about such extensive improvements in older types of equipment and processes, and radical advances have been made in its applications, as well as in the simplification of equipment. At the same time, the magnifying power and resolution were greatly increased.

By the substitution of high, intermediate and low-toned sound signals for the usual visual gauge indications for oversize, good and undersize readings, it was possible to utilize blind operators for delicate gauging operations.

Substitutes.—Scarcity of so many metals commonly available in plentiful amounts led to an extended application of substitutes, to save materials short in supply; for example, the use of steel in cartridge cases, and the use of steel in tanks to save one-third that much aluminum in parts formerly made of that metal. A saving of 80% in the requirements of copper for bullet jackets resulted from the use of steel plate clad with copper or gilding metal.

A different type of substitution came into play when it was necessary to use steel rolling facilities to supplement a shortage of capacity for rolling brass for cartridge cases. The chief difficulty to overcome was in controlling the grain size.

Lead-base die castings were extensively substituted for brass, aluminum and zinc-base castings. It appeared that lead-base bearing metals might also be used to replace similar alloys containing tin.

Plastic printing plates were developed to take the place of aluminum and zinc needed for other uses. A feature item in the development of the use of plastics (*q.v.*) as a substitute for metals was a plastic rivet that could be expanded in place by compressed air, the principle being similar to that used in the previously developed explosive rivet. A unique feature of the application was that once the rivet had been put in place, after warming to soften it, and had been expanded by air pressure, it could readily be removed if and when desired, by a second application of heat which caused the plastic to return to its original size and shape.

This novel property, known as "plastic memory," was expected to find many uses. (See also *INDUSTRIAL RESEARCH* and articles on individual metals.) (G. A. Ro.)

Metal Prices and Production

See MINERAL AND METAL PRODUCTION AND PRICES.

Metals Development Corporation

See RECONSTRUCTION FINANCE CORPORATION.

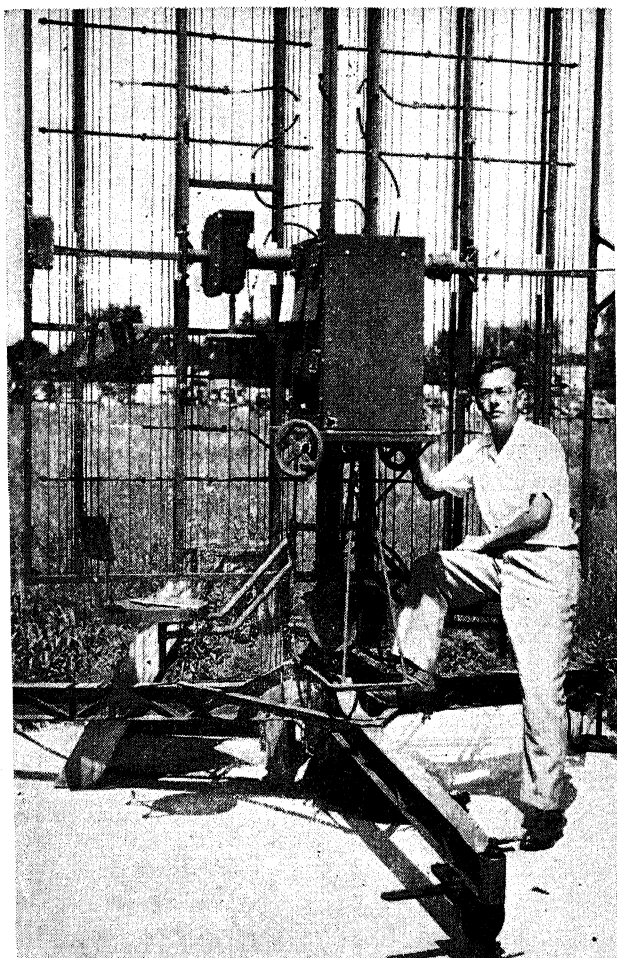
Metaxas, John

Metaxas (1871-1941), Greek statesman and soldier, was born April 12, 1871, on the island of Ithaca. He attended military schools in Greece and Germany and served in both the Graeco-Turkish War of 1897 and the Balkan Wars, 1912-13. His ability in directing field operations in the latter conflict earned him the post of chief of general staff in 1915, and he became King Constantine's closest military adviser during World War I. Twice exiled from Greece, once for plotting an unsuccessful monarchist revolt, Metaxas returned to his country's good graces and in 1926 was given the post of minister of communications in the newly created Greek republic. He was appointed minister of state in 1935 and a year later became premier. Once established in the premiership, Metaxas showed his scorn for democratic procedure. One of his first acts was to abolish parliament and all political parties; he declared martial law to quell a general strike, and with the consent of King George II proclaimed himself chief of state and ruled Greece with an iron hand. He also took over the portfolios of war, navy, air, foreign affairs and cults and national education. Metaxas again displayed keen military judgment when Italian armies attacked Greece in Oct. 1940, and he was credited with the Greek successes against the invaders in the ensuing campaigns in Albania. He died at his suburban home near Athens, Jan. 29, 1941, some two months before Greece's invasion by German forces.

Meteorology

During the eventful decade 1937-46, meteorology outgrew its earth-bound techniques and its dependence upon surface weather observations for indirect analysis of the ever changing state of the upper air and became the direct three-dimensional science of the entire atmosphere that nature destined it to be. Progress during these years was only a beginning, but it was most important. The air near the ground is not unimportant in the make-up of weather, but the almost limitless expanse of upper air and the interactions between vast chunks of the atmosphere which meteorologists call air masses are the principal determinants of weather and climate. The troposphere or lower portion of the atmosphere comprises a varying number of more or less distinct air masses, each comparatively homogeneous, level for level, within itself and each covering millions of square miles and extending from the ground several miles upward. When a distinctive air mass drifts away from its source region or gradually loses its identity, and a different air mass engulfs the land and sea, a change in weather occurs; and when contiguous air masses have very different characteristics in temperature and humidity the zone of conflict along their boundaries is usually the scene of rain, showers or other forms of stormy weather.

Meteorologists knew long before 1937 that many of the secrets of weather and climate were hidden in the upper air, but they had no practical means for making regular daily observations or measurements of the elements far above the ground and consequently no direct means of analyzing the ultimate causes of the changing weather. Scattered observations had been obtained by use of large kites or by balloons and aeroplanes, but these had given only a fragmentary sampling of the state of the atmosphere as a whole and its endless changes, and were a very inade-



Weather detector developed during World War II to forecast wind direction at varying levels, thus enabling planes to fly at greatest speed with minimum fuel consumption

quate basis for computing their causes and effects. After many years of experimentation, automatic instruments were developed for measuring the air pressure, temperature, humidity and other significant weather elements far above the ground. During the late 1930s, radiometeorographs were brought into daily use to obtain records of temperature, pressure and water vapour in the air aloft. The country-wide network of these radiometeorograph stations established in the U.S. in 1938 and 1939 was a major advance toward making meteorology an analytical science. During the years 1940 through 1945, the enormous wartime expansion of this system of upper air sounding stations throughout the world carried the advance much further. The total number in operation at one time probably exceeded 400 at the peak of military expansion.

Wartime Gains.—Although meteorology was not the only science to gain much from wartime intensification of scientific and industrial effort, and although its new and immediate applications were not as spectacular as those in several other fields, it was among the most outstanding in fundamental work preparatory to progress and far-reaching applications. To see the significance of this work it must be remembered that weather and climate are among the most controlling factors of man's environment. In peace they largely determine his food supply, his shelter and consequently his economic and social welfare. In war they sometimes decide the outcome of battle and they almost always enter into the cost and length of the struggle. The meteorologist attempts to describe and forecast the weather

so that man can adjust his plans and activities to fit the weather environment as it comes. Prior to 1940, meteorologists could visualize developments in their science no further than the remote possibilities of a full understanding of the ways of the atmosphere and an improvement in the scope and accuracy of weather forecasting. By 1945, however, there were a few who talked seriously of eventual control of weather on a limited scale, and although meteorologists in general were not ready to accept this vision and its consequent responsibilities, many could not overlook the possible use of newly found sources of energy to modify some aspects of weather and climate under favourable circumstances of topography and air masses.

Not least among the developments favourable for progress in weather science was the great increase in the total number of graduate meteorologists seriously engaged in research and development, especially during World War II. In 1937, probably not more than 2,000 persons in the entire world were working in meteorology at the scientific level, and the number of competent scientists in this field may have been less than 1,000. This did not include weather observers, whose total number in all classes of full and part time workers exclusive of amateurs, was much larger, probably about 50,000 and perhaps 75,000 if all those employed by or officially associated with recognized meteorological institutes and government weather services throughout the world were included. By 1946, not less than 25,000 had been trained at the scientific and professional level, and several times that many were employed as weather observers, technicians and subprofessionals of one capacity or another in meteorology and climatology. Thus meteorological knowledge was much more widely disseminated, and the roster of scientists with training and experience for research and development was much broader and numerically much larger than ever before. For the first time, meteorologists were numerous enough to make their work comparable in volume and importance with that of other major physical sciences.

Besides the radiometeorograph or radiosonde, as it was called in the U.S., for measuring elements above the surface air layers there were several other developments in meteorological apparatus that contributed to the scope and accuracy of weather data. Mensuration is the foundation of the physical sciences. Meteorology could never formulate accurate weather forecasts without exact and comprehensive measurements of significant weather elements, and extension of these forecasts in time range probably would depend on representative measurements throughout the earth's atmosphere. Many of the determinant conditions, for example, convergence, divergence and vertical motion in the air, radiation phenomena, physical and chemical structure of the upper air and energy transformation in the atmosphere were still wholly beyond the scope of the meteorologist's measuring instruments, or practically so. Moreover, weather conditions of crucial importance in air commerce and aircraft industries were causing serious trouble to those rapidly expanding operations, and strong demands arose for accurate measurements, reports and forecasts of these troublesome conditions. In 1937, there was meagre information for the aviator concerning fog, low clouds and other causes of poor visibility near the ground or surface of the sea, and even less knowledge of the conditions contributing to the accumulation of ice on aircraft in clouds and rain. By the close of 1946, noteworthy progress had been made in developing instruments and techniques for measuring and forecasting some of these conditions.

The radiosonde had been developed into the rawinsonde,

giving data for computing the winds above the clouds—information vital to safe navigation of aircraft. Two general designs were put into service, each giving wind data in addition to the pressure, temperature and humidity data given by earlier radiosondes. One design used the principle of the radio compass, the other, radar (*q.v.*). Radar itself had brought meteorological applications of the greatest promise for improvements in short range weather forecasting. Early in the use of radar it was found that rain showers often caused an image on the PPI scope or screen. Before long, radar observations were used for locating and tracking severe thunderstorms so that aircraft pilots and others with work adversely affected by such storms could be forewarned. Thus the radar observations had the effect of increasing the vision of the observer from the few miles within range of the naked eye to 100 mi. or more in the cases of thunderstorms. The open spaces or “blind spots” that had existed between the widely separated observation stations were effectively reduced in area and in some instances eliminated. In general, however, this applied only to detection of rain showers and thunderstorms, and only a few regions were covered by these radar installations. In 1944, the first successful photographs of radar views of distant tropical cyclones were made by the U.S. army and navy. One revealed something of the structure of a West Indian hurricane as it crossed the Florida peninsula; the other pictured a typhoon over the western Pacific. These photographs showed not only the central eye of the storm but also the pattern of associated cloud formations and other features not previously identified in tropical cyclones. In 1946, radar equipment was an important part of the instrumentation for a large-scale research project established in Florida to study the origin, development, structure and dissolution of thunderstorms, especially those hazardous to aircraft.

Experiments inaugurated during World War II in Canada, England and the U.S. were being continued in the effort to develop radar equipment of special design that would amplify the salient features of weather as seen in the PPI scope. There were indications that the principles underlying radar, together with developments in other electronics devices, would lead eventually to a new era in meteorological instruments and techniques for measuring atmospheric conditions. In 1946, the number of radar weather stations in the U.S. was being increased and a beginning made toward expansion into a network that would locate and track severe thundersqualls, tornadoes and hurricanes and thus enable meteorologists to give warnings more definite as to time, place and severity than had previously been possible.

Other New Devices.—Another apparatus for finding the approximate location and calculating the movement of remote storms came into greater use between 1939 and 1946. This device, the radiogoniometer for atmospheric or simply the spherics indicator, had a greater radius of observation than radar and sometimes could detect storms at a distance of 1,500 mi. or more. In general, its use was limited to storms that produce lightning or atmospheric since this is the phenomenon which the radiogoniometer detects in this case. Still another device for locating distant storms was developed to the point of limited use in 1944–46. This was a special form of seismograph which measures microseisms that often occur with severe cyclones (not tornadoes). It was used with some success in detecting hurricanes far at sea during the autumn of 1945 and in following the passage of a few of the most severe storms of the extratropical type over the far north. Obviously there were limitations to its usefulness, but there appeared

to be possibilities of its further development and use as an auxiliary instrument for locating severe storms under certain circumstances while they were still beyond the range of regular weather observers and common meteorological equipment.

At least two other important developments in the general field of scientific equipment gave promise of opening new vistas in meteorology and possibly leading to revolutionary changes in the techniques of analysis and weather forecasting. The electronics computer, known by different names in Europe and the U.S., appeared to open the way eventually to computation of complex meteorological problems and perhaps to exact weather forecasting by mathematical process. The high altitude rocket, invented primarily for purposes other than meteorological, seemed to be the vehicle by which the conditions of the atmosphere might be measured right to its outermost limits eventually. During 1946, a modest beginning was made toward adapting the extremely rapid calculations of the electronics computer to solution of the difficult expressions involved in prediction of weather by mathematical computation. One phase of the plan called for projecting the much earlier work of L. F. Richardson in England into a practical, everyday working technique—the aim of meteorologists for many decades. Whether the aim could ever be brought to reality was uncertain, for there was much difficult research work yet to be done before the numerous steps in the problem could be reduced to mathematical expressions that could be solved by the electronic computer. Related to this in some respects were the results of the experiments with very high altitude rockets. The upper air data procured by rocket might give some of the quantities required for mathematical treatment of meteorological problems. Although their practical significance had not been ascertained, rockets equipped to measure air temperature and pressure reached altitudes in excess of 100 mi. during test flights in 1946. The device also measured certain radiant energy phenomena. First results were not entirely satisfactory, but they were indicative.

Among the meteorological inventions which had immediate practical use during the early 1940s were the automatic weather station and the ceilometer. There were also improvements in humidity-measuring devices, long a practical need in meteorology, especially in upper air measurements at low temperatures, but these hardly got beyond the laboratory stage and were not yet ready for service use. The automatic weather station had been under development for many years, and several different types were being tested in Europe and America before World War II began. Intensive experimentation between 1940 and 1942 led to the production of serviceable models, and many of these were used for obtaining weather reports from uninhabited areas, wastelands and ocean regions where it was difficult to maintain stations manned by observers. The automatic stations were designed to operate for several weeks or even months without attendants. They automatically transmitted by radio at intervals of a few hours coded reports giving the principal weather elements, usually atmospheric pressure, temperature and wind. The automatic weather station gave promise as a valuable peacetime apparatus for closing the gaps in the weather reporting network over mountainous regions and other inaccessible places of significance in daily weather analysis and forecasting. Even more widely useful than the automatic station was the recording ceilometer which was developed during 1943 and 1944. This device permitted frequent

measurements of the altitudes of cloud ceilings, information required for safety and economy in aircraft dispatching and navigation. By use of a modulated light beam whose reflection from the cloud base was triangulated automatically and recorded in terms of the cloud altitude, it was possible to operate the ceilometer in daylight as well as at night. During 1946, ceilometers were installed at many airport meteorological stations in the U.S. to replace the older, inadequate methods of measuring cloud altitudes by use of ceiling balloons in the daytime and by manually operated ceiling light projectors read visually at night.

Research and development in the techniques of weather analysis and forecasting during the decade 1937-46 aimed primarily at better utilization of newly acquired knowledge of the upper air. Attention was also directed more toward studies of the general circulation of the atmosphere and its relation to the structure and movement of air masses. Typical were the research studies prompted by the disastrous droughts in 1934 and 1936 over the U.S. prairies, which gave rise to smothering dust storms from the so-called dust bowl and caused years of economic depression throughout the area. A project at the Massachusetts Institute of Technology aimed at a better understanding of the general circulation of the atmosphere as a basis for extending the time scope of weather forecasts and perhaps anticipating droughts sufficiently to take economic countermeasures to forestall disaster. Although the research did not accomplish all that was hoped, it brought out important new concepts of the general circulation and contributed to progress in other ways. The project was transferred in 1940 to the U.S. weather bureau, where it became a regular service activity as well as a research program. The foundation was laid for future advances in this field when the huge task of compiling and analyzing 40 years of daily synoptic weather maps for the northern hemisphere was completed during the war. This series comprised about 15,000 different maps, each with more than 2,500 different entries representing the weather conditions at several hundred places spread over the hemisphere. It was probably the greatest single collection of analyzed synoptic weather reports of its kind anywhere. The work was undertaken by the U.S. weather bureau supported by the army and navy to provide maps for military planning and operations. The maps had permanent value as working materials for research not only in meteorology and climatology but also in other physical and social sciences which have problems wherein weather and climate are factors. In addition to the surface weather map series, the project also produced during 1943-45 several series of daily upper air charts for the 3, 10, 13 and 16 kilometre levels; and later in 1945, monthly charts showing the normal pressures and temperatures, the extreme temperatures and the normal winds over the hemisphere at six selected levels up to 19 km. A ten-year series of daily synoptic weather maps for the tropical Pacific, prepared for use during the war, served also as source material for research in some of the little understood aspects of weather changes in the intertropical zone.

One use of these historical weather maps was for research in the analogue method of weather forecasting. This method was one of several on which intensive efforts were made to increase the accuracy and time range of weather forecasts for military purposes. Almost from its beginning as an organized science, meteorology was faced with constant demands for long-range forecasts; demands regarded as quite reasonable by the interested public since many

supposed that annual almanac forecasts were authoritative or that techniques yielding accurate predictions in astronomy should be applicable and equally successful in meteorology, two sciences often confused in the public mind. But never had official pressure for long-range forecasts been more insistent than during World War II, when the success of strategic and tactical plans depended on correct evaluation of the effects of weather on large scale manoeuvres and co-ordination of effort among all branches of the armed forces.

In the all-out effort and the desire to overlook no possibility, every conceivable method or technique was thoroughly, almost desperately examined. Special research units were organized by the meteorological services of several leading combatant powers on both sides. To make sure the search was not limited by too orthodox an approach, a few of the units were composed of scientists other than meteorologists, and they tried entirely new physical and statistical approaches to the problems of weather forecasting. The results were analyzed by impartial outside groups. These exhaustive analyses in 1944 and 1945 gave no real evidence of skill in individual day-by-day forecasts for periods more than a few days ahead. Even when the experimental long-range forecasts were couched in general terms as to time and place and were allowed tolerances so liberal as to make them almost useless for practical purposes, they showed little or no superiority over climatological expectancy, and in some cases they were no better than random chance. The encouragement and support given to these projects were almost without limit, and many claims of progress were heard, but there was little real progress in the forecasting of individual anomalies more than a few days ahead. Only in very general monthly forecasts based on studies of the broad circulation of the atmosphere was even slight progress evident.

In the statistical treatment of weather and the use of climatological data to calculate the frequency or "probability" of occurrence of particular meteorological phenomena for use in estimating weather risks, however, the intensive work between 1939 and 1945 brought noteworthy improvements. Comprehensive treatises of weather and climate over practically all parts of the globe were produced in England, Germany, the U.S.S.R. and the U.S. They were used in almost every phase of wartime planning and operating. They were studied in designing clothing and other materials and equipment, in planning logistics and in deployment of forces in active theatres of war. Machine tabulation methods with Hollerith punched cards were used for compiling these weather statistics. Many of the procedures and improved forms were converted to peacetime commercial and industrial uses during 1945-46, with promise of lasting and far-reaching economic value. Meteorologists hoped these were the beginning of a renaissance in climatology.

Although general improvements in weather forecasting fell far short of the hopes of layman and scientist alike, there was real progress in short-term forecasting of certain varieties of weather. Aviation expansion and new requirements between 1937-46 led to remarkable progress in the forecasting of cloudiness, cloud ceilings, fog, visibility and icing conditions aloft. Perhaps the most striking improvement from the standpoint of public interest and direct eco-

Field workers on a snow survey in western U.S. during 1939. Findings of such surveys were co-ordinated by the U.S. department of agriculture to estimate irrigation water supplies each year according to the amount of water in the snow



conomic value was in prediction of hurricanes. With reports radioed from military and naval reconnaissance planes which gave frequent and accurate fixes of a hurricane's position, reports supplemented occasionally by radar and spherics observations, forecasters were able to predict more accurately than ever before the intensity and movement of these severe storms. Never had life and property been so well protected from hurricane damage as it was after 1941. There was progress also in the forecasting of rainfall quantitatively, in river stage and flood forecasting and in season-long forecasts of water supply from snow-melt in some of the river valleys of the western U.S. From comprehensive studies of storm precipitation records, methods were devised for estimating maximum run-off within certain limits and thus engineering data were provided for use in designing flood control reservoirs and dam spillways.

Accumulation of upper air data led to emphasis on objective methods for evaluating the hydrodynamic and thermodynamic reactions involved in weather changes. These studies aimed to supplement or displace the previously used methods of indirect aerology. In the effort to integrate these dynamic factors into the preparation of the daily prognostic chart, several different forms of "energy" charts or diagrams were employed. Shaw's tephigram was rather widely used at first. Rossby's isentropic charts were adopted in the U.S. and used for several years, but by 1946 common practice again trended toward use of cross sectional charts, in most cases profile diagrams and constant pressure charts. Adequate working tools for fully utilizing upper air data in the daily routine of weather forecasting had not yet been devised. Many forecasters still considered the tephigram and the isentropic chart the best available means of evaluating the dynamic aspects for which they were specifically designed.

Literature and Organizations.—The meteorological literature of the decade naturally reflected the quickened tempo and broader outlook of the science and its applications. Innumerable monographs and technical articles were produced, many of them not released for publication because of their military origin. Among the new periodicals should be mentioned the *Journal of Meteorology*, a quarterly for technical papers, inaugurated by the American Meteorological society in 1944; and a popular monthly called *Weather*, which began publication by the Royal Meteorological society, London, in 1946. After the close of World War II, many articles began to appear in the daily press and in magazines describing new applications of meteorology to agriculture, commerce and industry. A very good series on this subject appeared with the daily weather maps published in Washington.

Meteorological organizations encouraged dissemination of this information for the purpose of broadening the base of applied meteorology and creating a demand for the professional services of meteorologists trained during the war who were ready to return to private life in 1945. It was hoped to expand the relatively new field of private practice in the meteorological profession. This movement came primarily in the U.S., having originated during the days when aviation requirements outstripped weather bureau facilities and private industry found it necessary to employ meteorologists to supplement the government's services. Later the development was encouraged as a means of stimulating meteorological progress and expanding its practical applications, thus increasing its economic value. In most countries, however, the government held that meteorological services were too closely related to public wel-



Experimental detector used to measure the height of cloud ceilings during the day; it was equipped with a photoelectric cell mounted at the focus of a reflector

fare and individual meteorologists too dependent upon the weather reporting and communication facilities of government to allow independent or competing services by private practitioners.

In international co-operation, meteorology had always been outstanding. Daily and sometimes hourly exchange of weather reports among nations is quite essential. Air masses move across national boundaries and the weather everywhere is more or less interrelated through the general circulation of the atmosphere. The International Meteorological organization, established in 1878, was relatively inactive during World War II, but its functions were carried on for the United Nations by the Combined Meteorological committee in Washington. The I.M.O. was reorganized by a special meeting of directors of meteorological services in London in February 1946; more than 40 nations were represented. Other outstanding events in international co-operation in meteorology were the training school for Latin-American students in meteorology in Medellín, Colombia, in 1943 and later extension of this program to provide for graduate training for selected students who were sent to universities in the U.S.; establishment of the Institute of Tropical Meteorology in Puerto Rico through joint action of the universities of Chicago and Puerto Rico; extension of the network for weather observations in the far north through co-operation among the meteorological services of Canada, Greenland and the U.S.; and agreement to maintain the network of weather station vessels established in the Atlantic during the war. This last mentioned agreement was accomplished in July 1946 through the Provisional International Civil Aviation

organization (P.I.C.A.O.) as the result of co-operation among the countries of western Europe, Canada and the U.S. (F. W. Rr.)

Great Britain.—Among the most outstanding British advances in meteorology during the years 1937–46 was the development of methods of representing the atmosphere as a three-dimensional structure. This was made possible by a considerable extension of the network of observations of pressure, temperature and humidity in the upper air, the observations being plotted either on constant level charts or on pressure contour charts.

The artificial dissipation of fog had been previously shown by meteorologists to be practicable, while preliminary experiments had confirmed this. As the result of a thorough investigation carried out in England during World War II, suitable equipment was evolved for installation on aerodromes, and was used on a number of occasions of widespread fog to enable returning aircraft to land in safety on English aerodromes. The equipment consisted of lines of high-efficiency burners consuming gasoline and giving intense heat without smoke, capable of being brought into action at very short notice.

The formation of cloud and rain was the subject of much discussion, and findings were summarized by G. C. Simpson in an article in the *Quarterly Journal of the Royal Meteorological Society* (67, 99, 163; 1941). Although it was long recognized that condensation of liquid waterdrops took place on nuclei, as demonstrated by J. Aitken, the formation of ice-crystals in the atmosphere was not understood. Observations by G. M. B. Dobson and B. M. Cwilog showed that when air was expanded adiabatically in a chamber so as to produce saturation, the highest temperatures at which ice-crystals appeared were quite sharply defined: -41° C. for air freed of nuclei; -32.5° C. for outdoor air; -27° C. for air contaminated with tobacco smoke. In the course of this work it was found that when the temperature was below about -83° C., rather large grains of ice similar to soft hail were formed, instead of ice crystals. Dobson and Cwilog developed an instrument capable of measuring accurately the humidity in the upper atmosphere by taking the frost-point temperature, i.e., the temperature at which ice is formed by direct condensation in very cold air; the use of this instrument showed, in all the ascents into the stratosphere obtained, that the air in the stratosphere was very dry. These were the first direct observations of humidity in the stratosphere.

The vexed question of the electric polarity of thunder clouds was settled, and it was generally agreed that the upper part of the cloud, roughly the part where the temperature was below -10° C., was positively charged, and the lower part with temperature between -10° C. and 0° C. negatively charged, while in some thunderstorms there was in addition a small volume of intense positive charge in the lower part of the cloud, in the region where a large quantity of condensed water was held in suspension by the upward convection currents. The positive charge was explained by the splashing of the drops during collisions, in the manner described by Simpson in 1909.

Dobson showed that the vertical temperature distribution in the stratosphere and the change with height of the annual variation of temperature at very high levels could be explained qualitatively as the result of radiation and absorption by carbon dioxide, water vapour and ozone. Some progress was made in understanding the details of the transport of energy through the atmosphere by radiation, and it became evident that in heat transport radiation was much less important than turbulence, convection and condensation in ascending damp air.

Although the causes of pressure variations in the atmosphere had not been fully elucidated, there was some progress, and valuable contributions were made by R. C. Sutcliffe, R. W. James and S. Petterssen. Sutcliffe related the production of low pressure at the surface to the existence of convergence of the a-geostrophic wind at low levels, and of over-compensating divergence in the upper troposphere. He also emphasized the effect of vertical motion in producing departures of wind from geostrophic. The work of James and Petterssen showed that the pressure tendency at the surface is compounded of (a) the surface pressure times the convergence of the isobaric mean wind (means of winds at equal intervals of pressure) of the whole atmosphere and (b) the component of the isobaric mean wind normal to the surface isobar times the gradient of surface pressure.

The factors affecting visibility were clearly enumerated by H. L. Wright, who showed that sea-salt nuclei, being much larger than combustion nuclei, played a more important part in the determination of visibility. The latter were only of importance when they were extremely numerous. According to Wright, only the number and size of sea-salt nuclei and the quantity of solid pollution needed to be taken into account in determining visibility, the Aitken dust counts being of no value in this regard.

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Weather of the Decade.—In a ten-year period, almost anything can happen to the weather, and almost everything in the meteorological lexicon did happen at one place or another during the decade 1937–46. Only a few of the most outstanding can be mentioned to illustrate the variety of the many weather events of the period.

The drama of weather in the decade was opened in Jan. 1937 by one of the most disastrous floods in U.S. history. Protracted rains and warm weather which melted snow on the still-frozen ground caused the Ohio river and many of its tributaries to overflow their banks, and in many localities all previous records of flood stages were surpassed. Damage to industrial and residential property was unusually heavy. At the same time in the western half of the continent, all-time records for cold were broken, especially in Montana and California. Two of the most severe freezes ever experienced in the citrus country of California caused disastrous losses to trees and fruit. On the U.S. prairies, 1937 was another year of subnormal rainfall, and in Kansas record droughts were again experienced. Coming right after the severe drought years of 1934 and 1936 and the "dust bowl" with its desiccating winds and dust storms, the continuing deficiencies in rainfall were doubly serious. In other parts of the world, 1937 produced its quota of storms and unusual weather, but in general these were not as record-breaking as were

the floods and droughts of North America.

The year 1938 was characterized by abnormally warm weather throughout the northern hemisphere. From scattered reports in the Arctic it was concluded that surprisingly high temperatures prevailed in that region, and in the U.S. practically every station showed above average temperatures for the year. In the British Isles, the most severe drought in a century occurred, one locality having been wholly without precipitation for 33 consecutive days. Compared with normal, March was relatively the warmest month in most regions. Probably the most devastating storm of the year was the New England hurricane which swept northward along the Atlantic coast Sept. 16-22, causing the loss of more than 494 lives and property damage totalling more than \$200,000,000. It was the first West Indian hurricane in a century that had followed a route close to the populous cities on the U.S. eastern seaboard and retained such destructive force until it reached Canada. Outstanding also was the number of tornadoes during the year. These storms, much smaller in area than

a hurricane but even more destructive locally, numbered 220 during the year and caused damage estimated at \$9,000,000. They occurred in 33 states and resulted in approximately 1,500 personal casualties, 183 of them fatalities.

The years 1939 and 1940 saw less disastrous weather than the two preceding years, although storms and other abnormalities in one part of the world or another still made frequent headlines. Unusually severe cold was experienced in Europe early in 1940. England reported the coldest January since 1838, and ice conditions in the Baltic, on the Danube and rivers of western Europe were the worst in a century. Ground froze to a depth of 16 in. in some parts of England, and the Black sea froze over at Odessa. In the ice storm and snow of Jan. 26-29, 1940, the ice coating on trees and wires attained a thickness of four in. in some parts of the British Isles and remained several days before melting. Toward the close of the year, on Armistice day, a driving blizzard and severe cold wave swept down from Canada and engulfed the northern plains and Great Lakes areas of the U.S., causing a temperature drop of 50° F. within 24 hours in many localities.

It was the most severe wind storm ever recorded in the upper Lakes region and caused the loss of 166 lives and damage to property probably exceeding \$8,000,000.

The cold weather during the winter of 1941-42 in eastern Europe was assured a prominent place in history because of its influence on military operations on the Russo-German front. As in several other major campaigns of the war, the weather was a factor in deciding the outcome. Foreknowledge of and preparation for decisive meteorological conditions more than once changed impending defeat into eventual victory. Such was the case in the exceptionally stormy period over the English channel during early June 1944, just preceding and during the "D-day" operations, when successful co-ordination of military arms on land, sea and in the air depended upon selection of a day with certain conditions of weather. The start of the invasion was postponed one day in the light of the meteorological outlook. Again in Dec. 1944, the German break-through in the battle of the Bulge was halted when unusually good flying weather during Dec. 23-30 enabled the defending forces to make full use

Table I.—Average temperatures in °F. in typical cities of the United States with comparative data showing high and low years during 1937-46

Cities	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Years
Albuquerque, N.M.	Average 34	39	46	54	63	72	76	75	68	60	44	35	55.2	52 yr.
	High 34	40	48	61	64	78	78	76	71	56	42	40	57.4	1946
	Low 29	40	44	52	64	73	76	69	59	43	36	55.2	1944	
Bismarck, N.D.	Average 8	12	25	43	55	64	70	68	58	45	28	16	41.1	69 yr.
	High 12	15	27	48	60	66	73	71	57	46	32	24	44.0	1941
	Low -2	15	16	47	51	62	73	69	57	49	29	23	41.0	1943
Buffalo, N.Y.	Average 25	24	32	43	54	65	70	69	63	51	40	29	47.0	74 yr.
	High 27	25	45	44	55	70	71	66	64	57	44	32	49.5	1946
	Low 18	25	27	40	53	63	70	70	61	49	39	33	45.6	1940
Charleston, S.Car.	Average 50	52	57	65	73	79	81	81	77	68	58	52	66.0	47 yr.
	High 53	58	62	66	72	82	82	80	79	69	55	51	67.4	1939
	Low 40	49	55	63	70	81	81	81	75	67	59	55	64.6	1940
Chicago, Ill.	Average 22	25	35	47	58	68	73	72	65	53	38	27	48.4	50 yr.
	High 25	35	45	50	58	68	74	75	65	59	44	29	52.2	1938
	Low 16	29	32	45	54	67	74	72	65	57	39	34	48.7	1940
Knoxville, Tenn.	Average 39	42	49	58	67	75	77	76	71	59	48	40	58.6	75 yr.
	High 40	49	57	61	68	73	78	80	72	62	50	40	60.9	1938
	Low 27	40	47	59	75	76	77	77	70	61	49	46	57.8	1940
Los Angeles, Calif.	Average 56	56	58	60	63	66	71	71	70	66	62	57	63.0	68 yr.
	High 57	54	59	63	64	67	71	73	77	72	67	64	65.4	1939
	Low 57	54	60	59	62	63	67	71	69	65	59	60	62.2	1944
Miami, Fla.	Average 68	68	71	74	77	80	82	82	81	78	73	69	75.2	48 yr.
	High 69	73	74	76	77	81	82	82	80	71	68	71	76.1	1939
	Low 70	65	70	72	77	80	80	81	80	75	71	67	73.9	1943
New York, N.Y.	Average 31	31	39	49	60	69	74	73	67	56	45	36	52.4	74 yr.
	High 34	31	50	50	61	69	74	71	70	62	50	39	55.0	1946
	Low 25	33	35	46	60	68	75	70	66	53	45	39	51.2	1940
Oklahoma City, Okla.	Average 38	40	50	60	68	77	81	81	74	62	50	40	60.1	55 yr.
	High 45	37	54	60	72	78	85	82	80	67	50	46	63.1	1939
	Low 35	41	52	60	69	76	80	80	74	68	46	43	59.3	1940
Portland, Maine	Average 23	24	33	43	53	63	68	67	60	50	39	27	45.9	67 yr.
	High 32	30	31	43	56	64	71	72	61	49	40	27	48.1	1937
	Low 16	22	39	47	50	61	67	66	61	46	38	22	44.5	1945
Seattle, Wash.	Average 41	42	46	50	56	60	64	64	59	53	46	43	52.0	54 yr.
	High 45	47	51	54	60	64	66	66	64	57	45	46	55.5	1940
	Low 32	41	49	49	57	63	66	64	61	57	49	45	52.7	1937
San Francisco, Calif.	Average 50	53	54	56	57	59	59	59	61	61	57	52	56.5	75 yr.
	High 54	55	58	56	61	60	60	61	64	61	58	53	58.5	1941
	Low 51	51	53	55	56	59	60	58	63	60	55	51	56.0	1946
Washington, D.C.	Average 33	35	43	53	64	72	77	75	68	57	45	37	55.0	49 yr.
	High 37	39	54	56	66	73	77	73	71	62	53	42	58.5	1946
	Low 25	37	41	51	64	75	78	73	67	56	48	43	54.8	1940

Table II.—Average temperatures in °F. in typical cities of the world (except for U.S.: see Table I.)

Cities	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Years
Edinburgh, Scot.	37	39	40	45	50	56	59	58	54	48	41	39	47.0	167
London, Eng.	39	40	42	47	53	59	63	62	57	50	44	40	49.7	80
Lisbon, Port.	51	52	54	58	60	68	70	71	68	62	56	52	60.3	56
Stockholm, Swed.	27	26	29	38	47	57	62	60	53	43	35	28	42.1	—
Baghdad, Iraq	49	54	61	71	81	90	94	94	88	78	63	53	73.0	24
Bombay, India	76	76	80	83	86	84	81	81	81	82	81	77	80.6	42
Calcutta, India	67	71	80	86	86	85	84	83	83	79	74	67	78.8	42
Manila, P.I.	77	78	80	83	83	82	81	81	80	80	78	77	79.9	46
Singapore, Brit. Mal.	78	78	79	80	81	80	80	80	79	79	79	78	79.3	—
Cape Town, U. of S.Af.	70	70	68	63	59	56	55	56	58	61	64	68	62.3	68
Johannesburg, U. of S.Af.	67	65	63	60	54	51	51	54	59	63	64	65	59.6	20
Salisbury, S.Rhod.	70	69	68	66	61	57	56	60	66	71	71	70	65.3	26
Quebec, Can.	10	11	22	36	51	61	67	64	56	44	30	16	38.5	—
Toronto, Can.	22	21	30	42	54	64	69	67	60	49	37	27	45.2	48
Victoria, B.C., Can.	39	40	43	48	53	57	60	60	56	50	45	41	49.3	33
Winnipeg, Can.	-4	0	15	38	52	62	66	64	54	41	21	6	34.6	48
Melbourne, Austr.	68	67	65	60	54	50	49	51	54	58	61	65	58.3	—
Sydney, N.S.W., Austr.	72	71	69	66	60	56	53	55	60	64	67	70	63.5	—
Perth, Austr.	74	74	71	66	60	56	55	60	58	61	65	71	64.0	—
Wellington, N.S.W., Austr.	63	63	61	57	53	49	48	49	52	54	57	60	55.3	60
Bogotá, Colomb.	58	58	59	59	59	58	57	57	57	58	58	58	57.9	—
Buenos Aires, Arg.	74	73	69	61	55	50	49	51	55	60	66	71	61.0	69
Colón, Canal Zone	80	80	81	81	81	80	80	80	80	80	79	80	80.2	17
Mexico City, Mex.	55	57	61	64	65	64	62	62	61	59	57	54	59.9	47
Rio de Janeiro, Braz.	78	78	77	74	71	69	68	69	70	71	73	76	72.9	65

Table III.—Average rainfall in inches in typical cities of the U.S. with comparative data showing high and low years during 1937-46

Cities		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Years
Albuquerque, N.M.	Average	0.4	0.3	0.4	0.6	0.7	0.7	1.4	1.3	1.0	0.8	0.5	0.4	8.5	53 yr.
	High	1.2	0.2	1.0	1.2	3.1	0.9	2.2	1.1	1.9	2.7	0.4	0.2	15.9	1941
	Low	0.3	0.3	0.5	0.8	T	T	1.1	2.3	0.3	0.4	T	0.4	6.3	1945
Bismarck, N.D.	Average	0.5	0.5	0.9	1.5	2.3	3.4	2.3	1.8	1.3	0.9	0.6	0.5	16.4	69 yr.
	High	0.6	0.1	0.8	1.6	1.0	5.6	2.3	2.9	3.9	1.0	0.3	0.1	20.3	1941
	Low	0.4	0.8	0.6	0.5	2.5	3.2	2.4	0.8	1.1	0.2	0.8	0.2	13.4	1938
Buffalo, N.Y.	Average	3.1	2.8	2.7	2.6	2.8	2.8	2.9	2.8	2.9	3.1	2.9	3.2	34.7	74 yr.
	High	4.4	2.1	1.8	4.6	3.0	5.9	3.0	2.1	1.1	3.6	2.3	3.8	37.7	1937
	Low	2.7	2.1	2.0	1.7	1.1	0.8	3.4	1.1	0.9	2.4	3.1	1.7	22.1	1941
Charleston, S.Car.	Average	2.9	3.3	3.3	2.7	3.2	4.6	7.0	6.6	4.9	3.2	2.2	2.8	46.7	74 yr.
	High	1.6	2.6	3.6	1.4	0.1	11.0	13.4	12.8	0.8	2.6	2.4	10.6	62.6	1941
	Low	1.1	0.8	0.3	2.7	3.9	3.1	5.9	3.6	5.2	2.6	0.6	1.2	31.1	1938
Chicago, Ill.	Average	1.9	2.1	2.6	2.5	3.5	3.5	3.4	3.0	3.2	2.6	2.5	2.1	32.8	100 yr.
	High	0.8	1.2	2.3	4.2	7.6	4.1	1.3	4.2	6.0	1.2	2.9	1.7	37.5	1945
	Low	0.9	1.7	4.5	3.3	4.4	3.2	1.9	1.9	1.6	0.6	1.3	1.1	26.4	1944
Knoxville, Tenn.	Average	4.5	4.7	5.2	4.3	3.8	4.2	4.6	4.0	2.8	2.6	3.2	4.4	48.1	75 yr.
	High	4.3	3.7	5.0	0.8	5.2	2.0	9.2	8.9	2.8	3.1	1.0	8.3	54.4	1942
	Low	2.3	0.9	4.1	4.0	0.7	3.9	8.4	3.3	1.0	2.5	2.6	2.5	36.2	1941
Los Angeles, Calif.	Average	3.0	3.4	2.8	1.1	0.4	0.1	T	T	0.2	0.6	1.1	2.9	15.5	68 yr.
	High	1.6	9.8	7.9	0.5	T	T	T	T	T	T	T	7.3	27.2	1938
	Low	0.6	1.1	1.3	2.4	T	T	T	0.2	T	0.6	0.2	1.0	7.4	1942
Miami, Fla.	Average	2.7	2.0	2.6	3.4	6.6	7.1	6.0	6.2	9.0	8.8	2.7	1.9	58.9	58 yr.
	High	2.9	2.4	3.3	0.8	11.1	13.5	1.9	9.6	17.8	2.9	1.5	4.0	71.7	1940
	Low	2.0	T	1.3	2.4	5.1	2.2	5.4	1.5	2.9	3.2	0.2	2.4	28.7	1944
New York, N.Y.	Average	3.6	3.5	3.8	3.3	3.1	3.5	4.2	4.3	3.6	3.5	3.1	3.3	42.9	75 yr.
	High	5.3	2.2	6.6	5.1	1.5	3.4	2.2	3.1	8.6	3.4	7.1	3.2	51.7	1944
	Low	1.8	1.7	3.3	1.3	5.9	4.9	4.5	3.5	2.4	0.8	1.4	2.5	33.9	1946
Oklahoma City, Okla.	Average	1.3	1.2	2.1	3.3	4.8	3.9	2.5	2.8	3.2	2.9	2.1	1.6	31.7	55 yr.
	High	1.2	2.9	4.2	7.0	2.6	10.1	4.4	3.4	7.4	0.4	0.3	0.1	43.9	1945
	Low	1.2	0.1	1.2	2.7	1.8	4.7	0.7	2.4	2.9	2.3	2.5	1.1	23.5	1937
Portland, Maine	Average	4.1	3.9	4.1	3.5	3.3	3.3	3.3	3.2	3.2	3.2	3.5	3.8	42.2	73 yr.
	High	3.9	3.9	1.9	3.3	6.8	5.8	2.6	1.3	3.8	5.5	5.1	5.9	49.8	1945
	Low	3.7	2.6	1.1	2.7	3.5	1.7	2.2	8.3	2.9	1.5	2.1	4.5	36.8	1946
San Francisco, Calif.	Average	4.8	3.8	3.1	1.6	0.7	0.2	T	T	0.3	1.0	2.5	4.4	22.2	96 yr.
	High	8.2	6.7	4.8	4.1	1.2	T	T	T	T	0.9	2.0	7.3	35.2	1941
	Low	3.1	1.9	2.6	0.4	0.6	T	T	T	1.1	0.2	0.2	1.1	11.2	1939
Seattle, Wash.	Average	4.8	3.7	3.1	2.3	1.8	1.4	0.6	0.7	1.7	2.8	4.8	5.5	33.3	68 yr.
	High	2.6	6.8	2.3	4.6	1.6	3.2	0.7	1.2	2.4	1.9	8.3	8.5	42.7	1937
	Low	3.8	2.8	3.4	1.6	1.0	0.4	0.2	0.5	0.5	2.9	2.9	3.0	23.0	1938
Washington, D.C.	Average	3.6	3.3	3.8	3.3	3.7	4.2	4.7	4.0	3.2	2.8	2.4	3.3	42.1	75 yr.
	High	7.8	3.3	1.5	6.9	4.0	5.2	3.7	6.7	1.8	8.8	3.9	0.7	54.3	1937
	Low	3.0	0.9	2.6	2.7	1.6	4.4	5.7	1.9	0.5	1.1	0.8	3.9	29.2	1941

T=trace: less than 1/100 of an inch.

Table IV.—Average rainfall in inches in typical cities of the world (except for U.S., see Table III)

Cities	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Years
Edinburgh, Scot.	2.0	1.7	1.6	1.5	2.0	2.1	2.8	2.9	2.4	2.6	2.4	2.3	26.01	154
London, Eng.	1.9	1.7	1.8	1.5	1.8	2.0	2.4	2.2	1.8	2.6	2.4	2.4	24.5	—
Lisbon, Port.	3.5	3.4	3.5	2.9	2.0	0.8	0.2	0.2	1.5	3.1	4.5	4.1	29.7	57
Stockholm, Swed. (Uppsala Obs)	1.3	1.1	1.2	1.2	1.7	2.0	2.7	2.9	2.1	2.1	1.7	1.6	21.6	74
Baghdad, Iraq	1.2	1.3	1.3	0.9	0.2	0.0	0.0	0.0	0.0	0.1	0.7	1.2	7.1	42
Bombay, India	0.1	0.1	0.1	0.1	0.7	20.0	24.0	15.0	11.0	1.7	0.4	0.1	72.4	50
Calcutta, India	0.4	1.0	1.4	2.2	5.6	11.9	12.7	13.4	10.0	4.9	0.7	0.2	64.3	92
Manila, P.I.	0.8	0.4	0.8	1.3	4.4	9.3	17.3	16.0	14.3	6.7	5.2	3.0	79.6	36
Singapore, Brit. Mal.	9.7	7.1	7.3	7.8	6.5	7.0	6.7	7.8	6.9	7.9	10.1	10.4	95.1	—
Capetown, U. of S.Af.	0.7	0.6	0.9	1.9	3.8	4.5	3.7	3.4	2.3	1.6	1.1	0.8	25.3	87
Johannesburg, U. of S.Af.	6.2	5.2	4.4	1.7	0.8	0.1	0.3	0.5	0.9	2.6	5.0	5.3	33.2	37
Salisbury, S.Rhod.	7.5	7.4	4.5	1.0	0.5	0.1	0.1	0.1	0.3	1.1	3.7	5.8	31.9	28
Quebec, Can.	3.7	3.1	3.2	2.4	3.2	3.9	4.1	3.9	4.0	3.5	3.6	3.4	42.1	—
Toronto, Can.	2.8	2.4	2.4	2.3	2.8	2.7	2.8	2.8	2.7	2.6	2.6	2.5	31.3	46
Victoria, B.C., Can.	4.6	3.3	2.5	1.6	1.2	0.9	0.4	0.6	1.9	2.5	5.8	5.8	30.9	30
Winnipeg, Can.	1.0	0.7	1.2	1.4	2.0	3.1	3.1	2.2	2.2	1.4	1.1	0.9	20.2	35
Melbourne, Austr.	1.9	1.8	2.2	2.3	2.2	2.1	1.9	1.8	2.4	2.7	2.2	2.3	25.6	—
Perth, Austr.	0.3	0.3	0.7	1.7	4.9	6.6	6.4	5.6	3.3	2.1	0.8	0.6	33.3	—
Sydney, N.S.W., Austr.	3.7	4.2	4.8	5.6	5.1	4.8	4.8	3.0	2.9	3.2	2.8	2.9	47.9	—
Wellington, N.S.W., Austr.	3.3	3.1	3.3	3.8	4.7	4.8	5.6	4.5	4.0	4.1	3.5	3.2	48.1	62
Bogotá, Colomb.	2.3	2.4	4.1	5.7	4.5	2.4	2.0	2.2	2.4	6.4	4.6	2.6	41.6	58
Buenos Aires, Arg.	3.1	2.7	4.4	3.5	2.9	2.5	2.2	2.5	3.0	3.5	3.1	3.9	37.3	55
Colón, Canal Zone	3.7	1.6	1.6	4.3	12.4	13.3	16.0	14.8	12.5	15.1	20.7	11.4	127.4	58
Mexico City, Mex.	0.2	0.2	0.5	0.7	1.9	3.9	4.5	4.6	3.9	1.6	0.5	0.2	22.8	47
Rio de Janeiro, Braz.	5.0	4.5	5.3	4.2	3.2	2.2	1.7	1.8	2.6	3.3	4.1	5.5	43.3	65

of their combatant aircraft. The entire record of World War II was so replete with such situations that some writers made hyperbolic reference to it as the Weather War.

In Sept. 1944 the second destructive hurricane in six years struck the New England coast. This time the populace remembered the 1938 storm and took heed of the warnings of gale winds and high tides. The loss of life was greatly reduced, the total deaths from the storm being 46.

Damage to immobile property and to small craft that could not be protected was heavy. The wind velocity at Chatham, Mass., attained 105 m.p.h. In the southwest Pacific, where tropical cyclones occur more frequently than in the Atlantic, the vessels of the U.S. fleet suffered losses from typhoons during both 1944 and 1945. The Okinawa typhoon of Oct. 1945 was very destructive to shipping and to shore installations, but advance storm warnings made possible by aerial reconnaissance kept loss of life to the minimum.

During 1944-45, Australia suffered the worst drought in its history. It was estimated that 20,000 sheep perished as a result of the cumulative effects of unbroken dry weather, and total damage exceeded \$250,000,000. In Sept. 1946 exceptionally heavy rainfall in Ethiopia caused the highest flood waters in the Nile in 90 years. In Colorado, November recorded the heaviest snowfall in 33 years, piling drifts 10 ft. deep in parts of Denver. The last month of the decade brought reports from Siberia of the lowest natural temperature ever recorded on the surface of the earth (-94° F). December also brought strong gales to

western Europe that caused heavy damage to shipping, and ice storms to the eastern U.S. that resulted in several fatal aircraft accidents. Perhaps the characteristic feature of the weather toward the close of the decade was the continued trend toward higher average temperatures in most parts of the world from which weather reports were obtainable. Meteorologists considered this only a phase of the irregular 25 to 50 year-swings on either side of the "normal" and expected a reversal toward moderately lower average temperatures within a few years.

The accompanying tables show the average values of temperature and rainfall for a number of typical localities. (See also DISASTERS; FLOOD CONTROL.)

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Methodist Church

The decade 1937-46 covered the most eventful years in the history of U.S. Methodism. It marked the reunion in one body of three churches, originally one, but separate for a century or more, which comprised nearly nine-tenths of all the Methodists on the continent. This consummation of the most important union, in point of numbers, which had occurred in Christian history indicated the trail for similar unions of other denominational families, and eventually of U.S. Protestantism. The three uniting bodies were the Methodist Episcopal Church (5,092,465 members), organized in 1784; the Methodist Protestant Church (198,000 members), dating from 1828-30; and the Methodist Episcopal Church, South (2,771,240 members), which separated in 1844 and was organized as an independent church two years later. These groups had divided on questions of polity, not of credal differences. All were true to the basic doctrines formulated in the middle of the 18th century in England by the Reverend John Wesley for "the people called Methodists."

The Methodist Protestants represented a democratic protest against the authority of the bishops and the exclusion of lay members from any voice in the government of the church. The breach with the Methodists south of the Mason and Dixon line was the first alarming evidence of the tension which eventually was to lead to secession of the Confederate states. After the American Civil War, the two major Methodist bodies, each strong in its own section, began to infiltrate each other's territory, creating constant friction. "Northern" conferences were organized in every southern state, and westward movements of population developed "Southern" Methodist conferences in California and the Pacific northwest. It took decades of such rivalries before Methodist statesmen on both sides awoke to the fact that "the Methodists are one people," and several more before they were in a temper to settle their differences around a council board.

Sectional and racial factors complicated the problem. The first protocol was rejected by the south, and another decade elapsed before a plan of union was accepted by both groups and in the so-called Uniting conference in Kansas City, Mo., in May 1939, became the constitution of the new Methodist church. Meanwhile, both these "episcopal" bodies had so curbed the power of the bishops and admitted laity to so large a share in the direction that the Methodist Protestants asked to be included and were admitted to the union. The plan of union set up a general conference, composed of equal numbers of clerical and lay delegates, meeting quadrennially; a judicial council sitting as a court of appeals; and six regional jurisdictions in the United States, five of them with territorial boundaries and names and the sixth, nation-wide called "central," comprising the Negro membership of the former Methodist Episcopal and Methodist Protestant churches.

Each division had its own jurisdictional conference, meeting once in four years, which had charge of its local interests and power to choose its bishops. These were still rated as "general superintendents," though their residence and administrative action was restricted to their respective

jurisdictions. The bishops of all the jurisdictions belonged to the council of bishops, meeting at least once a year to consider church-wide interests and to initiate plans for common action. Back of all these groups were the annual conferences, about 100 in number, administering local affairs and electing delegates to the general and jurisdictional conferences. The annual conference, a distinctive feature of Methodist polity throughout the world, was made up of the ministers and one lay member from each pastoral charge.

Despite bitter opposition from a southern group, which took to the South Carolina and federal courts questions as to the validity of the legal process of union and challenged the claim of the Methodist church to exclusive use of the former name Methodist Episcopal Church, South, the plan of union was upheld and the right to use the names of the uniting bodies was confirmed. Nothing came of the threat of a "wee free" organization. The number of "die-hards" who withdrew to enter other denominations was negligible.

After the action of the uniting conference came the business of reorganizing the administrative machinery of the united Church. The administrative agencies of the three churches were replaced by seven boards, namely: publication, missions and church extension, education, hospitals and homes, temperance, evangelism and lay activities. The many interests of the former women's societies were assigned to a division of the board of missions and church extension, entitled "Woman's Society of Christian Service." The words "prohibition and public morals" were dropped from the designation of the former board of temperance.

Jurisdictional Conferences.—The jurisdiction was an innovation in Methodist polity. It was a basic provision of the plan of union, devised as a means of protecting the southern group from domination by the northern majority of a general conference, the lawmaking body. Without some such check it was evident that no plan of union could have been accepted. It also made possible the inclusion of practically all the Negro members in one jurisdiction, the central. This provision was offensive to some Methodists of both races as being a segregative measure, and constituting an un-Christian discrimination on account of colour. Yet it proved generally acceptable to most of the Negro leaders, since it secured to their race the right to choose their share of bishops, and full and equal representation in the general conference and on all administrative boards. Moreover, it was a natural application of the existing practice in the Methodist Episcopal and Methodist Protestant churches of maintaining separate annual conferences for Negroes. (The Southern Church had few Negro members, having encouraged its former membership of that race to organize as a distinct denomination after the Civil War under the name of the Colored Methodist Episcopal Church.)

Two series of jurisdictional conferences were held after the union, in 1940 and 1944. Apart from the absorbing and often exciting business of electing bishops, they found very little to do except listen to speeches and reports. The complaint was heard that the jurisdictional conference was "a fifth wheel," unnecessary and superfluous machinery in a church already highly mechanized. It was urged, moreover, that the elections should be returned to the general conference. The smaller group, it was argued, lent itself to the art of "log-rolling," and limited the field of choice. It was claimed that the bishop thus selected and restricted to his own jurisdiction no longer had the prestige of the former bishop, elected by the whole

church from anywhere in the church, who could "travel at large through the connection" without trespassing on any other episcopal domain, and presiding with full authority over any annual conference between the two oceans. One jurisdiction, the southeastern, undertook to find a way of doing something, having set up an executive office with a full-time secretary and an expense budget; also the far-flung western jurisdiction, stretching from Pike's Peak to the Golden Gate, inaugurated a small *ad interim* body of 25 members, as a council, to make possible more effective discharge of its functions. Unless the field of jurisdictional activity became more definite, and more effective methods of cultivation were developed, this feature of the new constitution might be remodeled, though it was not likely to be eliminated as long as the sectional differences of ideology continued.

Attitude Toward War.—World War II brought with it difficult problems to this world-wide church. For years its world peace commission had preached pacifism, or something like it. Its leading pulpits absolutely condemned all war. The general conference of 1940 met in a world at war. The question of the attitude of the Methodist church toward a possible U.S. entrance into the conflict could not be avoided. Indeed, it was pressed with great vigour and ability. The debate resulted in a declaration that the church could have nothing to do with war, if it should come.

After Pearl Harbor, however, at least 1,000,000 boys from Methodist homes enlisted or were drafted. Methodist ministers to the number of 1,600 left their charges to serve as army or navy chaplains. Bishop Adna W. Leonard, on a tour of duty among the chaplains in the field, was killed in the crash of an army plane in Iceland and buried there with military honours. The general conference of 1944 met in a changed atmosphere. The forces which had won the antiwar victory four years before, came up with a resolution reaffirming the previous action. They won in the committee, but in the full house, after a great debate, the committee report was rejected by the narrowest of margins. The vote was taken "by orders," the ministers and laymen voting separately, with concurrence of both orders necessary. The laymen gave a substantial majority against the report. The ministers concurred by a majority of a single vote. The final action was strong in its condemnation of war, as a means of settling disputes, but omitted the declaration that the church must keep aloof from it. As the war went on, the Methodists went with the country, responding loyally to every call of the government. However, it was true that, while Methodists co-operated vigorously in the U.S. war effort, Methodist "conscientious objectors" outnumbered all others, except Quakers and Mennonites.

Crusades.—A movement, popularly known as "The Bishops' Crusade," because it was initiated by the council of bishops, brought to the Methodist church in 1942-43 the importance of applying Christian principles to the organization of the peace after World War II, which was then at its height. At a notable conference in Delaware, Ohio, in March 1943, several distinguished speakers discussed the basis of a new world order and their addresses had wide circulation in book-form. Later, a series of meetings were held in important centres throughout the nation under the direction of the bishops, in which the principles which should dominate the peace settlements were emphasized and the people were urged to write their senators and congressmen in support of these principles.

Following the bishops' crusade came the crusade for Christ. After thorough preparation, the general confer-

ence of 1944 set up a commission which was charged with conducting five specific denominational activities in the quadrennium 1944-47. These were (1) the raising of a fund of \$25,000,000 to be expended for restoration, rehabilitation and advance of activities, institutions and programs which had been arrested or otherwise damaged by the war, directly or indirectly; (2) to check, and if possible, reverse the alarming decline which had affected enrolment and attendance in Methodist Church schools (*i.e.*, Sunday schools) for a decade, a loss which was not peculiar to this denomination; (3) to promote an evangelistic campaign with the objective of adding a million members; (4) to spread the principles and practice of Christian stewardship, *i.e.*, systematic devotion of a definite share of one's income to Christian benevolence; and (5) to work for a new world order, to do away with war, organize for peace and remove the causes of racial and industrial strife. This program was prosecuted with characteristic vigour and method, quotas being assigned to each unit—area, conference, district and pastoral charge. The first objective, \$25,000,000, the largest sum ever asked of the church in a single year, was promptly pledged and paid. The pledges ran up to \$27,777,663, on which \$26,668,847 had been paid in cash up to Sept. 1, 1946. Evangelism, the third objective, made some progress toward its goal of 1,000,000 accessions to membership within the year. The council at its session in Sept. 1946 appointed a committee of 12 of its number to lead a church-wide attack on the belief that a third world war was inevitable.

War Rehabilitation.—U.S. Methodists expressed their sympathy for the suffering people in the war-devastated countries of Europe and Asia by generous contributions for their aid. A special overseas relief organization for collecting and distributing these funds was set up by the general conference and placed under the direction of Bishop Herbert Welch. Its operations started even before Pearl Harbor. As early as 1940, on a day designated as "sacrificial Sunday," the Methodist congregations gave \$125,323 for this purpose. A year later, on a similar appeal, the people responded on the "day of compassion" with \$400,000. The offerings for 1941-42 aggregated \$180,000; in 1942-43 they reached \$464,049; and as the wounds of war became wider and deeper, all former figures were topped by offerings of \$612,726 in 1943-44 and \$671,296 in 1944-45. In the fiscal year which closed May 31, 1946, the total receipts for overseas relief were \$1,531,547, which total, however, included \$900,000 from the crusade for Christ. Apart from this crusade appropriation, the total direct gifts of the Methodist church for overseas relief during the war years amounted to \$3,153,868. More than one half (56%) of this sum was distributed by other than Methodist agencies to sufferers without regard to race or denominational connection. Such agencies as the Y.M.C.A. and the Friends Service Committee received large appropriations for their broad humanitarian programs, and these were skillfully transformed into food and clothing for distressed multitudes of innocent people. China was the largest beneficiary. In its share was a gift of \$56,000 for Madame Chiang Kai-shek's "War Orphans," but no nation, not even Germany, was overlooked in the distribution of the bounty. All of this money was devoted to the relief of suffering humanity. None of it was included in the large gifts from the crusade for Christ, which went from U.S. Methodists for the restoration of the more than 1,500 British Methodist churches and parsonages destroyed or damaged by the "blitz."

Publishing.—Methodists in every part of the world-parish followed Wesley's example by setting up printing-presses and circulating books and periodicals. In 1789, when the church in America was but four years old, it launched the Methodist Book Concern, which grew to be the largest religious publishing house in the world. The Methodist Protestants and the southern Methodists promptly did the same. Naturally, one of the first consequences of unification in 1939 was to consolidate the publishing organizations of the three churches under the name, "Methodist Publishing House." Large economies were effected by discontinuing the manufacturing plants in Baltimore, Pittsburgh and New York city (Dobbs Ferry) and concentrating production at Nashville, Cincinnati and Chicago. The number of periodicals was reduced from over 50 to 24, adapted to every need of the Church (Sunday) Schools. The *Christian Advocate* "family," formerly published in numerous regional editions at heavy loss, was broken up and replaced by a single well-staffed weekly under the historic name and issued from Chicago. Its editorial policy aimed to produce a church paper which should appeal to the average layman and laywoman. Circulation rose so rapidly that the *Advocate* became not only self-supporting but profitable. By Aug. 1, 1946, the circulation had reached 345,000, believed to be a high mark among papers of its class.

The Methodist Publishing House, having its chief offices in Nashville, Tenn., and operating a chain of stores in fourteen populous centres across the nation, prospered greatly during the decade. In the year which closed July 1, 1946, it did a business of \$8,830,000, as compared with the \$5,500,000 in aggregate sales of the three constituent houses in the year before the union. In this year (1946) as in the year preceding, it was able to distribute \$400,000 among the retired ministers, after large expenditures for equipment and the accumulation of a substantial reserve, exceeding \$2,000,000. After the year of union, the house distributed \$1,815,000 to these beneficiaries. The publishing output of 1946 was 2,177,261 volumes, together with a circulation of 5,448,774 copies of church school lesson helps and story-papers. The imprint "Abingdon-Cokesbury" was employed on the general religious books, as distinguished from its distinctively denominational issues. Nine of its publications were honoured by inclusion in the American Library association's list of fifty outstanding religious books of 1945-46. The house also published *Religion in Life, a Christian Quarterly*, edited by Dr. Nolan B. Harmon, with an Editorial Board representing the leading denominations. Closely associated with these publications was *The Upper Room*, a quarterly manual of daily devotion which had a world-wide circulation of three millions.

Missions.—While the "long years" of the business depression had their effect on the general giving of the church, the wartime prosperity registered large gains. Indebtedness on church property was reduced by more than one-half, and the heavy debt of the board of foreign missions (Methodist Episcopal) was entirely lifted. The mission fields in Europe, Asia and Malaysia were hard hit. Property in the path of armies was destroyed, and the drafting of pastors, displacement of populations and the organization of Methodist youth into Hitler youth groups played havoc with the churches of Central Europe. In China, Japan, Korea, Malaysia and the Philippines, conditions were even worse. The missions office reported to the general conference of 1944 that the force of 773 active mis-

sionaries of 1942 had dwindled to 630, of whom only 402 were on their fields. Some had found work in other lands or at home. After the war, however, doors reopened for their return, and they streamed back and were warmly greeted by the distressed people of the Christian communities. While much costly restoration of church and school property had to be done, large plans for expansion were made and young people were recruited and trained for missionary service. General respect for the missionary enterprise was increased by reports that sifted back from chaplains and other service men who had seen personally the transformations wrought by a century of missionary effort among the people of the Pacific Islands. The great response to the appeals of the crusades and for Overseas Relief was evidence that the missionary urge was still powerful among the Methodists.

Plans.—The Seventh Ecumenical Methodist conference, which was to be held in Oxford, England, in Sept. 1941, was abandoned on account of World War II and later was scheduled for the United States in 1947. These bodies, made up of representatives of world-wide Methodism, had met decennially since 1881. Though having no legislative power, they exercised a formative influence on Methodist policy. Another development of the decade was the organization of the Methodist Youth Fellowship in the Methodist church. It replaced all other young people's societies and showed marked vitality. In 1946 it began publishing at Nashville, Tenn., a bi-weekly organ, *Concern*. The Fellowship planned an international Methodist Youth conference, to be held in Cleveland, Ohio, in 1947 which was expected to bring together 10,000 young people. The Fellowship demanded representation of at least 15 members in the general conference of the Methodist Church.

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Metropolitan Museum of Art

See ART EXHIBITIONS; ART GALLERIES AND ART MUSEUMS.

Mexico

Mexico, a federal republic adjoining the United States on the north and Central America on the south, had an estimated population of 21,672,733 in 1945, and an area of 758,061 sq.mi. By the census of 1940, the population was 19,653,552—about 55% mestizo, 29% Indian and 15% white. The predominant language is Spanish, with an estimated 14% speaking only Indian languages or dialect. The population is overwhelmingly Roman Catholic.

Mexico City, the capital, had an estimated population of 1,464,556 in 1945 (1940 census, 1,448,422). Other principal cities: Guadalajara, 228,049 (1940, 229,235); Monterrey, 180,942 (1940, 186,092); Puebla, 137,324 (1940, 138,491); Mérida, 98,334 (1940, 96,852); León, 86,089 (1940, 74,155); Tampico, 81,334 (1940, same); Aguascalientes, 81,124 (1940, 82,234); San Luis Potosí, 78,042 (1940, 77,161); Torreón,

76,613; Veracruz, 70,958 (1940, 71,679); Chihuahua, 57,456 (1940, 56,805); Pachuca, 52,387 (1940, 53,354). Presidents during the decade 1937-46 were Lázaro Cárdenas (1934-Dec. 1940); Manuel Avila Camacho (Dec. 1940-Dec. 1946) and Miguel Alemán (took office in Dec. 1946). (X.)

Agrarian Revolution.—In his last annual message to the congress (Sept. 1, 1946) President Avila Camacho stated without further commentary that, "The redistribution of the rustic property cannot yet be regarded as terminated." His successor, Miguel Alemán, in the platform on which he campaigned, declared it necessary "to continue the agrarian policy of the government of the revolution until the want of all *ejidatarios* [organized peasants] who have not yet received lands is satisfied." At the close of the decade that began in 1937 there were still landless peons in Mexico, and toward the end of Sept. 1946, the disturbances on the part of land hungry peasants registered in the state of Tlaxcala were significant. Nevertheless, the history of the country through the ten-year period was largely the fulfilment of the land distribution promised as far back as 1810, when the curate of Dolores launched the movement for independence with the cry of *Tierra y libertad!*

Father Miguel Hidalgo y Costilla laid stress on land as essential for true liberty. So it was then and so it was at the end of the decade 1937-46 in a country so largely agricultural and whose other natural resources had been mostly foreign-owned. However, after Hidalgo's capture and execution while on his way northward to enlist, as he hoped, the support of the United States, the ups and downs of the movement were such that by 1821, when independence was achieved, his simple program had yielded to other aims cherished by the landed gentry and the clergy. From then on, until the revolution that flared up in 1910 was well advanced, the history of Mexico turned mainly on the growth and vicissitudes of a Liberal movement to wrest political power from the privileged groups, a condition more easily grasped by the developing middle classes than by the illiterate peasants who formed the bulk of the population and who—nearly 100% of Indian stock—demanded ownership of the land of their ancestors. This demand went unheeded, but at a crucial moment Venustiano Carranza—leader of the Liberal movement at that time—issued at Veracruz the decree of Jan. 6, 1915, ordering the return to the peasants of all lands illegally taken from them in the past. This was designed to draw to the Liberal side, or at least to counteract, the strong land-reform movement led by Emiliano Zapata; but it achieved much more: it gave *la Revolución* a paramount agrarian character. Mexicans seem agreed to hold the effective enforcement of that decree (enlarged and incorporated in article 27 of the 1917 constitution) as the yardstick, together with the norms of "Effective Suffrage" and "No Re-election," for measuring the success of the various governments that had ruled the country in the name of the revolution. By this standard, the ten years 1937-46 were the most truly revolutionary of all. The land reform was a pledge which not until that decade found an administration in a position to redeem it vigorously. The same could be said of the two political norms mentioned.

Lázaro Cárdenas, inaugurated president of the republic on Dec. 1, 1934, had had no need to wage a strenuous electoral campaign. As the candidate of the powerful National Revolutionary party (P.N.R.) his victory at the polls was assured; yet he undertook to visit not only all the cities and towns accessible by modern transportation but many of the outlying regions of the country, intent on reviving the common people's waning faith in the revolution. A printer's apprentice in the small Michoacán town of Jiquil-

pan, he joined the ranks of the revolution when only 17 years old, in 1913, and in 20 years of army service, through labyrinthine political contentions that were resolved mainly by force of arms, rose to a full generalship, to the governorship of his native state and to be the head of the war department, having gained a name as a humane chieftain, an idealist and a friend of school teachers. Ernest Gruening, a ruthless critic of the Mexican army as it was in 1926, had singled him out for exceptional praise in the book *Mexico and its Heritage* (New York, 1928). After becoming president, Cárdenas was forced to deal adroitly in order to extricate himself—and the country—from the influence of former President Plutarco E. Calles, who went into exile. Out of this struggle Cárdenas emerged as one of the forceful personalities of Mexican history. He was determined on the land reform.

On Oct. 6, 1936, he decreed the expropriation and redistribution of the cotton and wheat lands of the Laguna region. Momentous significance was attached to this measure. Even in the best of circumstances the land reform could not but be difficult. It was difficult to determine what lands could be rightfully seized and redistributed, and to whom; difficult to assess the value of such lands in order to provide payment for the ousted owners; difficult to deal with these outraged and by no means powerless individuals, aliens as well as nationals of Mexico, who fought the reform by fostering revolts, involving the country in wars of religion and in foreign claims, using among other weapons the rejection of the government bonds and thereby lowering the nation's credit at home and abroad; difficult, finally, once the lands were conveyed to the peasants, to aid these new owners—and aided they had to be—in carrying on agricultural production without much loss of volume. From the date of the Carranza decree to Nov. 31, 1934, 17,000 land petitions by that many peasant groups were filed with the government, but in all those 19 years, only 4,674 petitions were fully resolved favouring 793,442 families. In contrast, once the Cárdenas administration found its stride, 5,956 petitions were resolved in a single year (1935-36) benefiting 565,216 family heads. In 1937 that tempo was sustained. The highlight of this undertaking was the Laguna expropriation, which destroyed whatever hopes or fears may have been entertained that the revolution might fall back again, as it had so often done, to an easier pace after a spasmodic sprint. The land reform could not be stayed, and conviction of this was one of the factors that brought peace to the country.

Large portions of the countryside had been kept in turmoil of armed revolt in the preceding decade. Now, with the definiteness of the land reform, the movement subsided, and the elements opposed to the revolutionary program hinging on the agrarian issue channelled their efforts along other lines: the formation of open political groups which under the law could contend for leadership of the public opinion and for public office. Fanatics had contrived to fight the Liberal heritage of the revolution by fighting the land reform, but when this attitude proved futile, *Sinarquismo* was launched in May 1937—a movement denounced at times as harbouring secret fascist aims but with leaders described as staunchly independent of foreign influences and as resolute against resort to arms. In certain states, especially Guanajuato, *Sinarquismo* enlisted many thousands of followers—peasants and artisans—much given to protestations of nationalism in public demonstrations with banners. To those of its component groups who demanded it, lands were granted and agrarian

colonies were formed that met with varying success. Feuds among its leaders, however, later weakened *Sinarquismo*. During the 1946 electoral campaign, nevertheless, it developed a political arm, the *Fuerza Popular* party, which succeeded in electing one member to the congress. A second antirevolutionary movement, often linked with *Sinarquismo* but repudiating the charge, was *Acción Nacional*, which had slight beginnings in 1933. In June 1939, it was revived, ostensibly under the leadership of certain prominent corporation lawyers, in Mexico City. It devoted much effort to recruiting a following among conservative businessmen. It specialized in conferences for the discussion of economic problems and for sharp criticism of the revolution as a whole. It too became a political party, the P.A.N., in the 1946 elections. Having failed to draft Luis Cabrera as its nominee for president, it entered only candidates for congress and won a few seats in the lower house. Cabrera was the minister to Carranza who in 1915 wrote the famous land reform decree but afterward became a constant critic of the land redistribution.

Laguna.—The Laguna expropriation, culmination of the agrarian revolution, and the progress made there, were described by an enthusiastic economist (Clarence Senior, of the University of Kansas City and the University of Puerto Rico) as *Democracy Comes to a Cotton Kingdom*, the title of a pamphlet distributed in the United States by the League for Industrial Democracy. The Laguna is an area bestriding the states of Coahuila and Durango over some 1,500,000 acres, the corner of a rainless desert, which two seasonal streams flood annually. Here, in 1936, lived 128,795 people in the city of Torreón—then a forty-year-old commercial and industrial centre—and in a few smaller towns nearby, while in the countryside 111,790 persons formed 368 scattered settlements of families, dwelling for the most part in mud-floored huts and even in caves underground, bound to the soil not by legal chains of peonage but by conditions of poverty and ignorance which were a worse bondage. At cotton-picking season this population more than doubled, then dwindled away with the dust the winds lifted and scattered, folding the carpets on which they had bet and lost in games of chance.

The land reform proclaimed in 1915 had made fitful headway throughout the country, and had even drawn near the Laguna, halting there. The Laguna afforded fortunes yearly which became legendary. This wealth accrued largely to absentee owners. Part of the land was farmed out to people who paid high rental for it, gambling on the abundance of water and the eventual yield. The effect of the Laguna immunity to the land reform, together with laxity elsewhere, depressed the people generally. Therefore, along with the considerable economic betterment of the peasants in the Laguna, the spiritual gain for the common people in restored faith was regarded as one of the accomplishments of that expropriation.

The Laguna "experiment," as it was widely known, brought in its wake a fast and unending sequence of tremendous duties on a government technically untrained, not always served honestly and hard-pressed financially: its revenues for 1936 had been only 385,174,561 pesos and for 1937 were 451,110,435. (The exchange rate at the time was 3.60 pesos for 1 U.S. dollar.) There was the duty to finance the *ejidos* (co-operative farm communities) into which the peasants were organized, the duty to direct the peasants in their labours in the fields now that the horse-

riding, whip-in-hand *capataces* (overseers) were abolished, the duty to guide the new owners in marketing their product, the duty to prepare leadership among them, the duty to persuade them to use mechanical appliances, to develop an understanding of sanitation, to feel the need of better housing—all this without regimentation or police constriction, a full test for the democratic ideal. In order to overcome the considerable outcry made both by reactionaries in Mexico and by critical observers abroad the government was put on its mettle to make in the Laguna, immediately, a better showing than private enterprise had ever made. The administration's main efforts centred here in 1937. Discussed and denounced under various aspects, even as a Russian-inspired communistic step bound to result in a fiasco or worse, the Laguna expropriation attracted world-wide attention. In 1938 a group of U.S. educators under the chairmanship of Professor Louis Gottschalk of the history department of the University of Chicago made a social survey of the Laguna. Gottschalk had visited communist farms in Russia. Frankly pessimistic about them, he was not inclined to a different attitude regarding the Laguna region before studying it in the field. At the end of his investigation he understood its peculiarly Mexican nature and he wrote (in the visitors' book of the National Ejido Credit bank): "I came, I saw, I was conquered."

The success achieved in the Laguna by 1938 can be told simply. People who erstwhile had laboured from dawn to nightfall for scant wages, taking their sleep on the bare ground or at best on straw mats, had in two brief years of change risen to the dignity of spring mattresses on bedsteads. House construction was widespread; schools were being built everywhere together with small clinics and a large central hospital; physicians and trained midwives were practising for fixed wages paid by the *ejidos* where none had practised before; a distance away a great dam (inaugurated Oct. 6, 1946, and given the name of President Cárdenas) was being raised to provide through the years an even control of the Nazas river waters. Irrigation ditches were being neatly laid out in a maze; some *ejidos* clung to the use of mules for harrowing and plowing, but these beasts were the best of their kind, imported from Missouri; not a few groups were putting their earnings in tractors and combines, others in electric fixtures for their brand new homes, and every one seemed eager and hopeful. The Torreón newspapers that under the old dispensation had prophesied ruin on the heels of expropriation now printed advertisements offering the "*ejido gentlemen*" (*señores ejidatarios*) choice Canadian and Scotch whiskeys and their ladies Hollywood toiletries. After a few cheerful years, however, the flush of success paled and discontent cropped up in the Laguna.

With profits between 40,000,000 pesos in "bad" and 60,000,000 in "good" years, the Laguna had yielded great wealth to its few former owners. It proved unequal to making over 30,000 families comparably prosperous. The soil there is fertile provided it has water, and water was not always abundant or even sufficient. Here as throughout the country the life of the peasants—roughly 70% of the total population—continued to be hard. But the history of Mexico changed after 1937 from that of a people discouraged with the sense of being forever frustrated to that of a nation unwilling to bear with unnecessary poverty, struggling in freedom, therefore, to overcome handicaps of which it became aware.

The administrative labour alone involved in the land redistribution, with the duties that it imposed on the government during the ten years 1937-46, was staggering

to contemplate. In most instances the *ejidatarios* had no inkling of the nature of credit or its techniques. The credit available for them was pitifully short, the government having to provide it in its entirety at first. Private capital, distrusting the land reform, refused to aid; in fact, even if it had been of a different mind, it had developed no experience along this line. *Ejido* administration systems had to be worked out by trial and error. Credit had to be developed. Innovations were sometimes slow. At the time the Laguna was made over to the peasants, the National Bank of Ejido Credit was operating with a capital of 120,000,000 pesos, financing the needs and actually directing the labour of 2,846 *ejido* societies throughout the country. In the Laguna alone—in 1936 and 1937—257 new societies were formed. In Yucatán, where the land reform was also spectacularly undertaken in 1937 and 1938 by breaking up the vast hemp haciendas, 33 *ejido* credit societies were organized with 46,112 family heads as members. In the Yaqui region of Sonora, 13 *ejido* societies were established with 1,995 members, and in the neighbourhood of Mexicali, in Lower California, just below the United States border, 65 *ejido* societies with 3,902 members were set up. These were the most sensational accomplishments of the Cárdenas administration in carrying out the agrarian revolution, but it was a much greater achievement than these simple figures indicate. Altogether, from Dec. 1, 1934, to Nov. 30, 1940—in the six years of Cárdenas—more than 1,000,000 peasants received land to the extent of 45,350,000 acres and were organized in 10,651 *ejidos*. In the following administration, under President Avila Camacho, that work was continued so that roughly about 1,800,000 peasant families that were landless when the revolution began in 1910 cultivated their own acres at the close of the decade 1937–46.

Avila Camacho took cognizance of the fact that something had to be done to implement the land redistribution. By 1940, production was not what it should have been. The parcels of land, usually no more than five acres of good soil per family, proved too small; under still-primitive methods of cultivation, in most cases, they did not yield enough to abolish poverty in the fields and to provide for the rest of the population. Sometimes under instigation of the expropriated owners, more often moved by discouragement, lawlessness sprang up among the *ejidatarios* themselves, and the less industrious would fall in ravaging bands on the fields of the more thrifty at harvest time. Throughout the decade the insecurity of the countryside was a constant menace to life itself and a deterrent to progress. The marauders were especially the bane of the small individual farmers and discouraged cultivation. Avila Camacho, however, did not heed the voices that would have him revive the strong-hand methods of another day. Although the death penalty—abolished by the revolution in the federal jurisdiction—was decreed as a wartime measure for murders in the open country and highway assaults, it was the deep conviction of Avila Camacho that in most cases the peasants looked askance at the lands given them, failing to improve or even cultivate them, because, besides the insufficiency of the holdings, they were unsure of owning them definitely under the *ejido* setup.

This kind of landholding was very widely discussed in Mexico after its revival by the revolution, especially during the decade 1937–46. It was as old as Mexico itself, dating from Aztec times when all lands were held in common by the tribe or the nation and were periodically redistributed, a parcel to each family. During colonial days, private land ownership as developed in the old world was introduced in Mexico, but the native communities

that were not destroyed by the conquest continued mostly to live under their own ancient system. At the same time the townships chartered by the Spaniards adopted the equally old Spanish custom of setting apart an area outside the town proper (to be found “as you left town,” hence called *exido* in the spelling of the time, literally “exit land” in English) which belonged communally to all the townspeople for pasturing and for fuel wood, corresponding to the commons of old England perpetuated in New England villages. Eventually the idea of the Indian common lands for all uses and that of the more restricted Spanish *ejido* merged, the latter giving its name to the former. How far the Mexican peasants had become individualistic, outgrowing their communal Indian tradition, was a much disputed question with relation to the land reform during the decade. A marked tendency in the direction of individualism was evident. Progress in Mexico, as evinced in the decade and chiefly with reference to land tenure, was oriented toward a growing sense of private ownership tempered by social-mindedness. A certain quality of socialism was inevitable, resulting from the fact that government initiative was under the revolutionary administrations of the decade, and even earlier, the main source of aid and direction.

Under President Avila Camacho there was instituted the registration not only of the *ejido* groups but of their individual members, and the *ejido* allotments were ordered measured off into individual parcels assigned personally to each *ejidatario* to guarantee him against any possibility of being arbitrarily dispossessed. At the close of the decade that task was under way. The main problem of Mexico no longer was land redistribution itself but the means of enlarging the individual parcels, of making these lands more productive and, in short, of advancing modern ways of agriculture. Towards these goals the land reform went forward. Irrigation systems, highways and railways opened or were designed to open new lands for distribution to relieve overcrowded *ejidos* and to increase the number of privately owned small farms. Model farms were set up. The improved cultivation systems introduced in most regions were expected to reduce the number of *ejido* members necessarily bound to the soil, making ready a population to be employed by industry. The course of Mexican history was thus changed more deeply than might be superficially perceived, but the land problem remained fundamental. The Mexican people by and large seemed to have acquired a clear understanding, or at least to have developed a sure instinct, of this change, and from 1939 to the end of 1946, Mexicans of all classes clamoured for the industrialization of the country based on increased agricultural production. To satisfy this demand was one of the main pledges on which Miguel Alemán was elected to succeed Avila Camacho. Meanwhile, the challenge of Mexico's handicaps was fully met.

Handicaps.—The scarcity of water had often spelled tragedy for the people in many regions of Mexico. Rain-fall had been calculated, from an agricultural viewpoint, as “very insufficient” for about 30% of the national territory, just “insufficient” for about 35%, and “sufficient” for the rest, or only a little more than one-third of all the lands in Mexico. “Abundant rainfall,” calculated for 23% of the whole area of the Argentine republic and 47% of that of the United States, is normal for only 13% of the area of Mexico. It is so concentrated in definite regions that it results in disastrous yearly floods, especially in the river basins towards the Gulf. During the decade 1937–46,



President Lázaro Cárdenas proclaiming the expropriation, in March 1938, of the properties of 17 British, American and Dutch oil companies in Mexico, which were then taken over by the national petroleum administration

the Mexican government was very busy constructing dams and irrigation systems, devoting progressively larger portions of its revenues to this item. From 1926, when this development began under Calles, to 1934, when Cárdenas became president, only 51,320,593 pesos had been spent for dams and irrigation projects. During the six-year term of Cárdenas, from 1934 to 1940, 160,319,281 pesos were spent for the purpose; and under Avila Camacho, from 1940 to 1946, the expenditure was enormous by comparison: 150,000,000 pesos in 1945, for instance, and 180,588,778 in 1946. A few flood-control projects were also undertaken, and plans were envisioned for multi-purpose river control. In 1945 and 1946 Miguel Alemán aroused national interest in the example set by the United States through the Tennessee Valley authority.

Another handicap, shortage of electric power, was naturally linked with the limited water projects in Mexico prior to the decade. There were no such obstacles as state rights or the opposition of "vested interests," which in the United States had figured prominently in projects of this kind. In Mexico the difficulties were technical on the one hand and financial on the other. In 1943, a 300,000,000 pesos 10-year plan was formulated which was speeded up as much as possible. Of the Mexican population of 21,000,000, only about 4,000,000 used electricity in any form at the end of the decade—a fact which accounted heavily for the backwardness of the country.

Along with the floods and the scarcity of water, many of the more populated regions of Mexico from time immemorial had been unhealthful. Yellow fever had been eradicated entirely; blackpox was practically banished from great areas of the country; typhus, too, came under certain measure of control; but malaria and intestinal and other infections were still rampant, taking a heavy toll of life during the decade. Both under Cárdenas and Avila Camacho, and as an adjunct to the land reform, a pro-

gram for supplying credit to the poorer communities for sanitation and potable water projects was initiated. A government bank was created for this purpose, a great tropical medicine research centre was established and students of medicine in the various universities of the country were obliged to spend a year in out-of-the-way communities. The federal health department and department of public welfare were joined in a single agency under a secretary of state in 1943 and the work undertaken continued to be co-ordinated with that of the state agencies in a vast network. By 1944, some 700 public health centres were functioning in the country, at a cost of more than 20,000,000 pesos a year, of which sum the central government contributed about 18,000,000; state, municipal and *ejido* treasuries contributed the rest. The manufacture of essential drugs was promoted, under state control, and their free distribution was increased among the poorer communities.

The cumulative effect of all these measures was immediately felt. By 1944, the general mortality rate, which had been 24.56 per 1,000 persons yearly in 1937, fell to 21.50 per 1,000 in 1943 and 18.7 in 1945. Infant mortality in the same period was reduced to 114 per 1,000 children under one year old, as compared with the average of 123.5 deaths per 1,000 children from 1928 to 1942. Health conditions in Mexican ports open to international traffic were maintained at a level internationally recognized as "A."

For centuries, and understandably so on account of its difficult surface, Mexico was a land of inadequate transportation facilities. Under Calles great modern roads were begun. Succeeding administrations carried on that work steadily. In the decade 1937-46, however, more roads were constructed in Mexico than in all its former history. At

the close of 1946 it had a highway system of 12,500 miles, stretching from the United States border at various points down to within only some 50 miles of the Guatemala border, forming a net linking various ports on the Pacific and the Gulf with inland towns and these with each other. Railway construction proceeded meanwhile more slowly but firmly. Rehabilitation of the existing rail lines was needed in order to make more effective Mexico's co-operation in the United States war effort, especially for the transportation of minerals and other strategic materials which Mexico supplied abundantly. The older roads suffered considerably under the strain of war time urgency and accidents were frequent, but not more so than in the United States during the same period. Aviation was almost entirely a development of the decade. Its growth, linked with that of United States aviation, was phenomenal but left promise of greater development. Various lines centering in Mexico City were flying ships northward east and west to the United States daily, east to the West Indies and south to Central America. Aviation fields were laid out everywhere, and national lines carried on an ever heavier passenger and freight traffic within the republic.

Illiteracy was another drawback of such magnitude as to endanger every purpose of the land reform and of the other aims of the revolution. The 1940 census recorded 9,411,075 persons of all ages as illiterate (7,161,109 more than 6 and less than 40 years old). There were 1,237,018 men, women and children who spoke no Spanish but only an Indian language or dialect. The efforts made during the decade to incorporate these people, through elementary education, into the economic as well as the cultural life of the nation were highlighted by the law of Aug. 21, 1944, enacted as a war emergency measure, whereby every citizen who could teach to read and write was enlisted in a National Campaign of the Alphabet. In a little more than two years and at an expenditure of less than 3,000,000 pesos (including the cost of printing 10,000,000 primers and writing tablets which were distributed gratis) almost 1,500,000 persons were given instruction and half their number had passed their examinations by Aug. 1946.

The lack of technicians of all kinds was felt sharply in Mexico. As part of the educational progress made by the country during the decade, a large Polytechnic institute was founded which drew a student body of several thousand young men. Under the direction of an eminent Mexican scientist, Manuel Sandoval Vallarta, formerly of the Massachusetts Technological institute, the new Polytechnic put Mexico in advance of most Latin American countries in scientific training. The National School of Agriculture at Chapingo continued to prepare agronomists and other experts greatly needed to further the land reform. Rural education also made great progress.

Two other aspects or derivations of the agrarian revolution should be more fully considered. First, the land laws as amended during the ten-year period, encouraged private ownership of holdings of not more than 245 acres of the best soil. (Considerably larger areas were allowed for other kinds of land and, over a fixed number of years, for cattle ranches). This was the *pequeña propiedad*. Under Avila Camacho, special measures were taken to insure its inaffectability and to safeguard it from encroachment by land-hungry peasants. It must be noted also that in every case of land expropriation the owner concerned was not entirely deprived; a *pequeña propiedad* was left to him including, in most instances, the manor house and its surrounding buildings. The difference between the *pequeña propiedad* and the *ejido* parcel assigned to an individual owner was that the latter might not be mortgaged or sold

or otherwise conveyed to another owner. Growing security in land tenure led to increased agricultural production, (which, however, remained deficient) and to the flow of private capital into rural credit channels. This development was the second important aspect of the land reform ushering in a new era in Mexican history.

Rural Credit.—Credit under modern systems of banking in Mexico dated only from 1864, when the first Bank of Issue, Circulation and Discount, as it was named, was founded. Prior to that date, money lending followed mediaeval patterns, and large credits had to be sought from foreign sources, which involved the nation in difficulties that at times jeopardized its sovereignty. Other banks followed in due course, but because of their failure to provide the relief sorely needed by agriculture a charter was finally granted in 1901 to the Agricultural Mortgage Bank of Mexico. By 1909, however, when the government investigated the agricultural credit services, not a single institution was found responding to this demand. "Of loan banks," the report said, "they have but the name." Private enterprise failed signally in this field, so government action was sought; but this course was followed timidly. Three of the existing banks joined in forming the *Caja de Préstamos para Obras de Irrigación y Fomento Agrícola* with a capital raised through bond issues which the government guaranteed. Instead of providing loans for irrigation and agricultural promotion works, which its long name indicated, the *Caja* dissipated 81,750,000 pesos for which it was indebted to foreign interests. The records showed that until the decade 1937-46 Mexico carried on, especially in agriculture, without proper credit facilities. For even when, in 1926, a law provided for the collaboration of the federal government, the state governments and private banks in forming the National Bank of Agricultural Credit, 18,000,000 of its initial capital of 20,000,000 pesos had to be supplied by the first of these partners, and about two-thirds of the bank's assets were loaned not to real farmers but to influential individuals who nonchalantly forgot these obligations as a matter of course. General Abelardo L. Rodríguez, the president whom Cárdenas succeeded, informed the congress in 1934 that as the capital of the National Bank of Agricultural Credit was "practically frozen," it had to be given 6,000,000 pesos to carry on. The Cárdenas administration increased that amount to 20,000,000 pesos in 1935. On Dec. 2 of that year the functions of the bank relating to *ejidatarios* were assigned to a new institution, the National Bank of Ejido Credit, with a capital of 120,000,000 pesos provided by the government.

After that reorganization the National Bank of Agricultural Credit was devoted exclusively to the *pequeña propiedad*. During the decade 1937-46 its objective was substantially that expressed in its report for 1944: "We are not and do not aspire to be private bankers. We are conscious that the bank exists precisely to fill all the gaps that private banking ignores. . . . We give a hand to farmers who have not been able to get ahead but who are willing; if in the end we succeed in having them improve their methods, endow their farms well [with equipment] and raise their living standards, that is our best reward, although a part of the loans made remain unrecovered."

The National Bank of Ejido Credit undertook to organize the more reliable *ejidatarios* in credit societies which grew from 3,679 with 308,729 members in 1936 to 5,896 with 451,948 members in 1945. During the decade 1937-46, it advanced credits amounting to a round 1,000,-

000,000 pesos. As its rate of recovery tended more and more to normal it was able, from 1938 on, to operate with private capital which it guaranteed. Its volume of business grew from 24,000,000 pesos in the first year to almost 500,000,000 in 1945. Its methods, however, were ponderously slow, calling for simplification.

After the Oil Expropriation.—(For details of the Mexican oil expropriation, see PETROLEUM.)

In resolving to carry out the agrarian revolution, President Cárdenas had not anticipated such additional difficulties as were brought about by the oil expropriation, which he had not contemplated and had tried to avoid. The six year plan that the National Revolutionary party had drafted as Cárdenas' platform could not be carried out in all details. Yet, in addition to the accomplishments of his administration already mentioned, he succeeded in organizing, under the National Bank of Labour Credit, a state-directed co-operative to operate the Emiliano Zapata sugar factory built at Zacatepec in the sugar cane state of Morelos; the national railways were placed under a workers' management but had later to be returned to government operation; congress approved a law stipulating the responsibility of public officials, designed to enforce honesty in the administration; the Civil Service law made government employees secure in their work and permitted them to unionize. On Aug. 28, 1938, the leagues of agrarian communities that had formed separately in every state and territory of the republic met through delegates and formed the National Peasants confederation (C.N.C.). Labor representatives from various Latin American countries gathered in Mexico City at the invitation of the C.T.M. and founded the Confederation of Workers of Latin America (C.T.A.L.) with Vicente Lombardo Tolezano, of Mexico, as its president. Fraternal delegates from other countries attended the founding ceremonies, including John L. Lewis, of the United States, representing the C.I.O. and Léon Jouhaux, of France, representing the C.G.T. The Mexican government honoured the request made by the president of the United States to admit political refugees in Mexico; this had already been Mexico's policy with reference to Latin American nationals and loyal Spanish republicans.

Altogether, a fine spirit of self-assurance and of assertive democracy pervaded Mexico; under its inspiration the campaign to elect Cárdenas' successor in 1940 was started in 1939. The suggestion that the principle of "No Re-election" be discarded in Cárdenas' favour was turned down, with a will to make real the other half of Mexico's motto—"Effective Suffrage"—stamped on all official documents.

The Cedillo Revolt.—In May 1938, one of the older leaders of the Mexican army, General Saturnino Cedillo, who had also had a career as secretary of agriculture and as governor of the important state of San Luis Potosí, rose in arms in his home grounds, making real the threat of civil war. Mexico stood the test. Public opinion denounced the revolt. President Cárdenas had expressed his desire that there might be no bloodshed during his administration. Repairing to San Luis Potosí, he directed the campaign to corral the rebels and capture them alive. Because of these instructions the rebellion lasted longer than would have been necessary. In the end Cedillo and his escort were unavoidably slain in a skirmish. Cedillo's failure was significant. It showed how deeply the temper of the country was for peace, and the army proved that it was no longer a springboard for ambitious *caudillos* but a reliable force for the support of the country's institutions.

Avila Camacho's Administration.—In 1928, President Calles had expressed the hope that the various revolutionary groups in Mexico might unite for political action. In 1928–29 there was organized at Querétaro the National Revolutionary party (P.N.R.) as the amalgamation Calles desired, appointing him *Jefe Máximo* of the revolution. It was this party that elected Lázaro Cárdenas in 1934. Now, towards the end of his term, Cárdenas called on the P.N.R., which had disowned Calles, to complete its democratization by broadening its base. From a union of political groups the P.N.R. became in 1939 a union of "social forces," the coalition of four "sectors"—labour, peasant, military and popular or middle class. The labour and peasant sectors, represented chiefly by the C.T.M. and the C.N.C., thus became components of the P.R.M. or Party of the Mexican Revolution as the reorganized P.N.R. was named. When both these sectors came out for the nomination of General Manuel Avila Camacho, most aspirants withdrew; but one of them, General Juan Andreu Almazán, formed a party of his own for the occasion—the *Partido Revolucionario de Unificación Nacional* (P.R.U.N.)—and led the opposition to the P.R.M. A number of smaller parties sprang up overnight, the law allowing their formation, and eventually a Coalition of Independent Parties was formed, with the P.R.U.N. for centre, which looked formidable on paper. When after the elections the various leaders of this grouping cast at one another charges of "betrayal," the entire setup collapsed definitely.

The electoral law called for the designation, by the municipal authorities, of polling places conveniently located. The first five citizens arriving at each place were supposed to form a board to supervise the voting. The aim of the law was perfection in democracy, but it resulted in numerous clashes for control of the boards. Considerably more than 2,000,000 voters turned out on election day; some 40 died and a few hundred were injured, counting the casualties suffered by both sides engaged in the contest. But there was no question in Mexico that Avila Camacho had won by an overwhelming majority on July 7, 1940. He had campaigned on a platform of great dignity, calling for the strengthening of the democratic freedoms and for national unity in face of the serious world situation. He had come out squarely for the solidarity of the Americas and had had occasion, in referring to the existing differences with the United States, to say that Mexico trusted in the efficacy of the good neighbour policy and in the integrity of President Franklin D. Roosevelt. When he was inaugurated president on Dec. 1 of that year, a brilliant gathering of special envoys from all the American republics, including vice-president-elect Henry A. Wallace of the United States, attended the ceremonies.

Almazán found it hard to reconcile himself with defeat. For a time after the election he seemed to believe in the possibility of a successful revolt. Discovering, however, that his "friends" had duped him, and publicly denouncing them, Almazán asked to be allowed to return to Mexico peacefully to retrieve the losses his fortune had suffered. He repatriated himself a few days before Avila Camacho's inauguration, and wrote a book.

Manuel Avila Camacho was born to a middle-class village family in Teziutlán, a town of Puebla high up among the mountains of that state, a centre for the active agricultural life of the region. He had begun to study accountancy, looking forward to a business career, when the revolution swept him away in its ranks in 1914. A year later he served as secretary to the first land redistribution agency in Puebla. Back in the army, he was never to leave military service until called to lead the P.R.M. While



Miguel Alemán on a tour of rural Mexican areas before his election to the presidency in July 1946. He is shown hearing a peasant woman of Zacualco state her case for the town's need of an improved water supply

still a colonel he won distinction during one of the uprisings that Alvaro Obregón had to crush, by refusing to accept his release on condition that he would quit the federal army. The alternative to that choice was facing a firing squad. Avila Camacho made arrangements for the safety of the officers under him, then declared himself ready for execution. His valour evoked the admiration of the rebels, who let him go unconditionally free. President Obregón raised his rank and had his loyalty cited on three consecutive orders of the day, a unique honour. Afterwards, under President Calles, Avila Camacho was sent to the state of Jalisco to put down a religious rebellion. He sized up the situation correctly. Instead of seeking to exterminate the rebels, he persuaded them that the revolution had no quarrel with religion, and met with success as a peacemaker. Later, as chief clerk, undersecretary and secretary of the war department successively in President Cárdenas' cabinet, Avila Camacho rose to the highest rank in the army and devoted great efforts to inculcate in the services a conscious understanding of the democratic ideal.

As candidate of the P.R.M., he won this party to the policy of co-operation instead of the class struggle. "Nothing," he said, "could be more harmful to the program of the revolution than to fail to understand in its fullness that, having saved man in our country from organized exploitation, the urgent task before us now is to save him from the oppression of poverty." This was on Oct. 29, 1939. "The class struggle," he further explained, "exists and should exist, but we must wage it under the law, resolved to find a way for class collaboration, unless we

wish to return to a condition of permanent poverty and cycles of violence and tyranny." Two attempts against his life were made during his term of office, which he confronted with a forgiving mind. In his farewell address to the congress he was able to say: "We exerted ourselves to overcome and eliminate the cult of violence. Even at the risk of having the manfulness of our purpose mistaken for weakness, between punishment and tolerance we chose tolerance, between forgiveness and anger we chose forgiveness."

As president he enforced the constitutional provisions which forbade the army as such to engage in political activities. The army sector of the P.R.M. was abolished. He promoted the amendment of article 3 of the constitution dealing with education, which had been a bitter issue for years. The new wording of this article tended to undo the notion that education under Mexican law was based on antireligious instruction. At his bidding the C.T.M. joined with employers' representatives in a pact of honour to keep strikes at a minimum during the war emergency. The labour-employer conflicts which had become frequent under Cárdenas when labour, assured of the friendliness of the administration, "felt its oats," now became exceptional. In 1942 and 1943, out of 775 major disputes, only 8 resulted in strikes and these were soon resolved. A department of the navy under a cabinet member was created, and the army and the aviation service were reorganized to make possible Mexico's determination to patrol its long littorals and be in a position to repel any invasion without need of United States forces such as were stationed in several Latin American republics. Permission, however, was granted for United States aviation units flying over Mexico to and from the Panama canal defenses to use

Mexican airfields, which were laid out at strategic points and fully equipped to provide efficient service. The six living former presidents of Mexico—three civilians (Adolfo de la Huerta, Emilio Portes Gil and Pascual Ortiz Rubio) and three generals (Plutarco Elías Calles, Abelardo L. Rodríguez and Lázaro Cárdenas)—rallied about Avila Camacho. Their coming together was dramatic. Calles' health did not permit him to rejoin the army, but Cárdenas was placed in charge of the Pacific coast defense area and later headed the department of national defense. To Rodríguez was entrusted the Gulf coast defense. By all these tokens national unity became a demonstrable fact. It was a united Mexico that accepted the challenge of war.

Foreign Policy.—Internally, Mexico prepared for war by concord between capital and labour, without infringement on the rights of either; by harmony among revolutionary leaders who had been estranged; by the achievement of peace on the issue of religious freedom, and by placing its armed forces on a war footing. Externally, Mexico strengthened its relations with the governments of the countries fighting the axis. Having resumed relations with Great Britain, Mexico recognized the various governments in exile established in London. President Avila Camacho received the visit of Premier Wladyslaw Sikorsky of the Polish government and agreed with him to extend Mexican hospitality to several thousand Polish refugees evacuated from the U.S.S.R. after June 21, 1941. These unfortunates, including several hundred orphans, remained in Mexico until 1946 under the joint care of the governments of Poland and the United States. Mexico had broken relations with the U.S.S.R. on Jan. 22, 1930, not brooking soviet interference in Mexican internal affairs; when Russia went to war with Germany and became an ally of Mexico, these relations were resumed on Nov. 19, 1942. But the heart of the foreign policy of Mexico was inter-American solidarity. To this great purpose Mexico bent its every energy. It was not the policy of a single individual, or of a government department or of the government itself alone but of the country as such, in keeping with the unbroken tradition to which Mexico had been faithful in every stage of its history as an independent state.

The government implemented the popular will. It was a policy resulting from Mexico's weakness as a nation, from its jealous sense of sovereignty often at stake, and from the perils it had encountered in a world largely ruled by force. Out of all this Mexico had deepened its conviction that no country should be allowed to interfere in the life of another country; that no territorial conquest by strength of arms or skulduggery could be valid; and that all freedom loving nations, especially those of the American hemisphere, should bind themselves firmly to defend these tenets. At the Havana Conference of the American Republics, in 1928, Mexico had taken up the cudgels for non-intervention as a principle of international law for the Americas. In the development of the good neighbour policy declared by President Franklin D. Roosevelt, Mexico's position was tacitly accepted by the United States. The formal agreement between the American nations reached at Montevideo, Uruguay, in 1933, outlawing intervention, was universally regarded as a Mexican triumph. Consistent with these principles, Mexico voiced at the League of Nations its refusal to recognize the conquest of Manchuria by Japan, the conquest of Ethiopia by Italy or the various capitulations under which Germany dominated Austria and other countries. In the case of Spain, Mexico's course was guided by principle to the exclusion of expediency in

any form. Mexico gave not only moral support to the legitimate government of Spain but supplied it to the fullest extent of its possibilities with Mexican-made armament. After the defeat of the Spanish loyalist armies, Mexico tendered a welcome to several thousand Spanish refugees, and in Aug. 17, 1945, gave official hospitality to the Spanish cortes which nine days later set up in Mexico City a government with which Mexico carried on friendly relations. Save only on the Spanish question Mexican policy did not differ sharply during the war years with the policy of the United States, not from compulsion of the stronger on the weaker country but from a common devotion to the freedom of all peoples and a common concept of democracy.

In inter-American matters during the decade, the United States often followed Mexican leadership, so many of the initiatives discussed and finally approved in inter-American official gatherings were of Mexican origin and not novel, but part and parcel of Mexican foreign policy in decades past. The outstanding position of Mexico began to be asserted in the 1933 Pan American conference at Montevideo and in the 1936 conference in Buenos Aires, Argentina. It was confirmed in the Lima conference in 1938, in the Panamá consultation of 1939 and in the Havana consultation of July 1940, all held during the term in office of President Cárdenas. Under Avila Camacho, Mexico consistently furthered the policy of welding inter-American solidarity—in the Jan. 1942 consultation at Rio de Janeiro, Brazil, where it pledged agreement with the Atlantic charter, and, finally, at the Chapultepec conference, held in Mexico City in Jan. 1945, where a charter for the Americas was drawn. Later, when Uruguay proposed a policy of collective intervention to be adopted by the American republics, the state department in Washington appeared to be in agreement with the idea but the majority of the other republics, notably Mexico, rejected it. Throughout the difficulties with the Argentine republic in 1945 and 1946 Mexico, too, maintained strict non-intervention and frequently expressed its conviction that Argentina would not fail to ratify the Chapultepec charter subscribing voluntarily to the principle that the solidarity of the Americas was indivisible.

In the early years of World War II, Mexico maintained a position of neutrality, strictly in accordance with international law. As a passive but significant protest, however, it withdrew its diplomatic missions and closed its consular offices in those countries that had been subjugated by the axis powers. German consulates in Mexico were ordered closed by President Avila Camacho. Under international regulations Mexico, on April 8, 1941, seized the German and Italian ships that had taken refuge in Mexican ports. On Oct. 31 of the same year Mexico joined the effort of Chile in seeking to have Germany recognize the moral law in respect of hostages. In protest against nazi brutality Mexico gave the name of Lidice to the pretty village of San Jerónimo on the outskirts of Mexico City. When Pearl Harbor was attacked, Mexico acted immediately on the commitment it had voluntarily made at Lima, Panamá and Havana; it severed relations with Japan on Dec. 8, with Italy and Germany on Dec. 11, and shortly thereafter with the governments of the countries that had sided with the axis.

Mexico at War.—Co-operation with the nations that were eventually to form the United Nations group, and especially with the United States, was vigorously promoted.

On Nov. 19, 1941 a Claims convention was concluded between the two countries, bringing to an amicable close a series of long negotiations on expropriations. Mex-

ico agreed to pay to the United States \$40,000,000, in annuities of no less than \$2,500,000 each, in cancellation of all claims of American nationals against Mexico for lands expropriated and for other causes—not including the oil companies' compensation and a few other matters left pending. The United States agreed to grant Mexico a special \$40,000,000 credit with the Export-Import bank in Washington for the stabilization of the Mexican peso, pegged at 4.85 pesos to the dollar, and for other uses, including the payment of the resolved claims. Mexico, however, had no need to draw on this credit. Further, on the same date, the United States treasury agreed to purchase Mexican silver up to 6,000,000 ounces monthly. These agreements and the numerous other friendly acts that followed cleared the atmosphere in which the two countries moved in a common purpose.

There was hardly an agency of the Mexican government that did not share in the co-operation between the two nations. Legal measures were taken to define acts against the national security (*delitos de disolución social*) and to establish penalties for such acts, outlawing and punishing fifth-column activities. The registration of all aliens was ordered, and the country was carefully combed to discover those who were illegally in Mexico and those who, having entered legally, were nevertheless undesirable guests. Registration of naturalized citizens was also ordered, and their records were scrutinized. By these measures a number of German agents who had fled from Canada and the United States and had arrived from Central and South America, as well as nationals of other countries in the service of the axis, were caught and dealt with according to law. An immigration station was established in the ancient castle of Perote, on the highway from Puebla to Jalapa, where such aliens as were to be deported were detained. These included the crews of axis ships seized. Later the Italians had to be segregated from the Germans in another similar station. All nationals of axis and pro-axis countries were removed from border zones and the seaboard, and ordered to report periodically to the authorities. The border with the United States was especially guarded against axis activity. No naturalization papers were permitted to be taken out by nationals of Germany, Italy, Japan, Bulgaria, Hungary or Rumania, no matter how long they had resided in the country. Telegraphic and radio communications were placed under government control. On the other hand, all British subjects were allowed entrance to Mexico on the same footing as nationals of the American countries. On Dec. 27, 1941, Mexico decreed that the American nations at war were not subject to the stringencies applying to belligerents, and the same privilege was later extended to non-American nations at war with the axis. A general permit was issued for vessels of all democratic nations at war, including their hydroplanes, to drop anchor or alight on national waters and ports. On March 27, 1942, an agreement was signed whereby Mexico acquired from the United States military equipment under lend-lease. Meanwhile, Mexican production of strategic metals and other material needed for the U.S. war effort was speeded tremendously.

United States agencies gave special grants to U.S.-owned mining concerns in Mexico to improve their equipment. All restrictions on the importation of Mexican oil were removed by the United States. On April 29, 1942, the production and prices of Mexican metals and metaloids came under a special agreement with the Metals Reserve company, the chief United States purchasing agency abroad. In January the Mexican-American Joint Defense commission had been established and, later, the Inter-American

Defense board, agreed on at the Rio de Janeiro consultation of the American republics, was set up, a ringing notice to the effect that Mexico would not brook any challenge to its rights.

When on May 13, 1942, the Mexican tanker "Potrero del Llano" was sunken treacherously by an unidentified submarine, and the "Faja de Oro" met the same fate a few days later in Gulf waters, popular clamour in Mexico voiced the indignation of an offended nation. The Mexican government through adequate conducts demanded satisfaction but obtained none from Germany, Italy and Japan. Thereupon the congress authorized the president of the republic to decree a state of war with those powers, as of May 22, 1942. On June 14, that year, Mexico signed in Washington the declaration of the United Nations of Jan. 1, 1942, committing itself not to sign a separate peace or agree to an armistice with the axis.

The shortage of farm hands and railway track workers in the United States, caused by the flow of manpower into the armed services and into the more highly paid war production jobs, made it imperative for various American allies to send their nationals to relieve that situation. Mexico responded generously, and under an agreement signed Aug. 4, 1942, Mexican volunteer farm hands were selected and dispatched to the United States. By Aug. 31, 1943, some 75,000 Mexicans had been enlisted for this work; a year later the enlistments were 113,431; in 1945 the maximum was reached, 139,688. In 1946, the need being still acute in the United States, some 30,000 to 40,000 *braceros*, as these workers were called, were supplied.

In Nov. 1942, an agreement was reached between the two governments for the operation in Mexico of a United States commission to aid in the work of railway rehabilitation, chiefly for improvement of the transportation of Mexican minerals, produced in huge volume. The commission was empowered to employ a special fund in this work, part of which consisted in taking Mexican railway workers to railway centres and repair shops in the United States for special instruction in U.S. "know-how." The Export-Import bank in Washington gave Mexico a \$30,000,000 credit for highway and railway construction and rehabilitation. In other fields, Mexican-U.S. co-operation proceeded on a level never reached before. On July 1, 1944, a plan was agreed on between Mexico and the United States for war time co-ordination of sanitary efforts, the United States contributing \$2,500,000. The Rockefeller foundation continued throughout the decade to lend valuable assistance in many ways, and other American institutions of like purpose extended their work to include co-operation with Mexico in promoting improved health services.

More important was the spirit shown during the war and postwar years for the satisfactory solution of problems pending between the two countries. On Nov. 2, 1942, an agreement was arrived at with the International Committee of Bankers, in New York, for the readjustment of the foreign debt of Mexico and the payment of its principal and interest. The total nominal value of the Mexican debt in arrears—\$274,669,277 principal and \$278,884,248 interest as of Dec. 2, 1942—was reduced to 230,631,974 pesos capital and a little over \$2,000,000 interest. On Feb. 20, 1945, another agreement was arrived at, with the same International Committee of Bankers, for settlement of the railway indebtedness of Mexico; the principal and interest in arrears were reduced from \$557,604,382 to an estimated total of 244,971,707 pesos.

In 1944 a treaty was concluded resolving the distribution between Mexico and the United States of the waters of the Colorado and Tihuana rivers on the west coast and of the Rio Grande from Fort Quitman, Texas, to its mouth on the Gulf.

The treaty was publicly discussed in both countries and was finally ratified with certain amendments by the United States senate and by the senate of Mexico.

Following President Roosevelt's visit to President Avila Camacho, at Monterrey, Mexico, on April 20, 1943, which gave vivid testimony to the spirit of friendliness between the two countries, a Mexican-American Commission for Economic Co-operation was established, which met in Mexico City and in Washington, and evolved ways and means to relieve Mexico's shortage of imports. Industrialization projects to cost an estimated 1,915,000,000 pesos were studied by this commission. Meanwhile, Mexico had established a National Financing (N.F.) corporation which, as reorganized in Dec. 1940, was designed to promote and finance the establishment of concerns for production (especially in lines that were less attractive to private enterprise), to create a national stock exchange and to act as the government's financial agent. From Jan. 1 to Aug. 31, 1946, this corporation provided capital for investments amounting in round numbers to 472,000,000 pesos. The N.F. obtained from the Export-Import bank in Washington various credits totalling \$63,000,000, which permitted the acquisition of industrial machinery by Mexico without recourse to a reduction of dollar reserves of the Bank of Mexico.

By a special covenant Mexico was authorized to recruit for its armed services nationals of the United States within its borders, and the United States likewise to enlist in its armed forces Mexican nationals within its territory (excluding *braceros* and bona fide students in U.S. schools), and a special registry of such recruits and a record of their service was agreed to be exchanged by the two countries. As of July 30, 1945, more than 15,000 Mexican nationals (not including, of course, United States citizens of Mexican origin) had served in the U.S. forces and had suffered 1,492 casualties.

Some won the congressional medal. By similar agreements several hundred Mexicans served with the British and French forces.

Mexico's chief responsibility, however, lay in keep-

ing in readiness to defend its territory, and all approaches to the United States, from invasion. National prestige, however demanded that the Mexican flag should be carried into battle overseas, and a Mexican Expeditionary Air force, consisting of squadron 201 of the Mexican aviation corps, received final training in the United States and was sent to the Pacific to co-operate with the United States air forces against Japan. This select contingent of Mexican eaglets was fully representative of the Mexican army as modernized during the decade. It bore itself with honour and its flag was placed, alongside the beloved flags of famous Mexican regiments that defended Mexico against old-time foes, in the Museum of National History in Chapultepec castle.

The feeling predominant among Mexicans during the war was that it was peculiarly their war. They took pride in the fact that great nations were proclaiming and fighting for principles which Mexicans had proclaimed and fought for throughout their history.

Especially, it was for Mexicans a vindication of their revolution.

The 1946 Elections.—In 1939, the tourist trade recovered from the drop it had suffered in 1938, registering 139,010 visitors to Mexico. This number increased to 173,104 in 1941 and kept up at that level in the following years of the decade. In 1945, tourist expenditures in Mexico were

Item	Mexico: Statistical Data 1938		1941	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate		1 peso = 22.12 cents 18 pesos = £1 (March 1938)		1 peso = 20.53 cents 20.5 pesos = £1
United States				
Great Britain				
Finance				
Govt. revenues	\$96,967 (£19,834)		\$95,541* (£24,945)	
Govt. expenditures	\$111,443 (£22,795)		\$115,677* (£30,203)	
Gold reserves	\$38,935 (£7,964)		\$30,045* (£7,845)	
National debt	\$309,929 (£63,393)		\$309,474* (£80,803)	
Transportation				
Railroads		14,487 mi.		
Highways		56,923 mi.*		
Airways		13,000 mi.		
Communication				
Telephones		158,379		178,726
Minerals				
Silver		81,018,809 oz.		82,640,074 oz.*
Petroleum		6,478,211 tons		6,843,269 tons*
Gold		923,819 oz.		950,000 oz.*
Lead		311,255 tons		216,720 tons*
Zinc		189,836 "		126,715 " *
Crops				
Sugar cane		4,544,704 tons		6,257,854 tons
Corn		1,865,092 "		2,341,379 "
Alfalfa		1,697,542 "		1,990,361 "
Wheat		358,247 "		351,284 "
Forest products				
Chicle		3,659 tons†		
Wood		483,485 ft.†		
Vegetable wax		1,527 tons†		
Sea products				
Fish and shellfish (preserved)		1,690 tons†		
Fish and shellfish (fresh) . .		6,092 " †		
Shrimp		3,528 " †		
Exports—total	\$185,411 (£37,924)	3,910,000 tons	\$150 (£37)	...
Silver	\$37,785 (£7,729)	104,288,000 oz.	\$26,770 (£6,639)	86,850,000 oz.
Gold	\$33,784 (£6,910)	1,165,000 oz.	\$14,223 (£3,528)	454,000 oz.
Lead	\$24,112 (£4,932)	277,000 tons	\$8,654 (£2,146)	169,000 tons
Zinc	\$17,697 (£3,620)	182,000 tons	\$7,579 (£1,880)	164,000 tons
Imports—total	\$109,309 (£22,358)	...	\$187,945 (£46,613)	...
Automobiles, trucks, chassis .	\$6,068 (£1,241)	10,587	\$27,595 (£6,844)	25,099
Rayon thread and floss . . .	\$2,610 (£534)	4,801 tons	\$4,128 (£1,024)	6,144 tons
Iron parts for machinery . .	\$2,605 (£533)	4,355 tons	\$3,327 (£825)	4,458 tons
Defense				
Standing army personnel . .		47,514		56,000*
Reserves		54,151		150,000*
Standing air force personnel .		170		700*
Military Expenditures	\$18,360 (£3,755)		\$17,442 (£4,554)*	
Education				
Elementary schools		14,091		23,181
Students		1,180,204		2,037,870
Teachers		25,857		46,652
Secondary school enrolment .		...		80,000
Technical schools . . . . .		...		100
Students . . . . .		...		8,760
Teachers . . . . .		...		488
Universities		6		10
Students . . . . .		...		30,000

*1940. †1939. ‡Exports only.

estimated at more than 180,000,000 pesos annually. After 1939, capital which had migrated from Mexico sharply reversed its trend and began to pour into the country to escape war restrictions abroad. This avalanche dislocated Mexican finances, creating in the country a class of wealthy refugees and expatriates sufficiently numerous to affect the economy of the country. Mexican exports, too, far exceeded the imports, and the trade balance in international commerce inclined overheavily to the Mexican side, producing an excess of circulation in the country, with resultant inflation. The cost of living went up by leaps and bounds. Black markets galore flourished beyond possible restraint by ordinary methods. The building trades prospered and real estate values soared. But production of food staples suffered considerably, and the prices of these commodities reached dizzy heights. Mexico had to import large quantities of maize, rice, sugar and other articles of consumption. To the more pessimistic observers it seemed as if the agrarian revolution, after all, had been unavailing to give the country an evenly distributed prosperity. Facile moralists preached alarming warnings signifying nothing more than that the hard-hit middle and lower classes were restless and critical. Labour now felt free to strike for higher wages, in a mood similar to that exhibited in the United States.

Under such conditions the political campaign to elect Avila Camacho's successor was started when, on June 1, 1945, Miguel Alemán resigned as secretary of *Gobernación* to accept the call made on him by numerous workers' organizations throughout the country to run for president.

Alemán chose to campaign on a program for the industrialization of Mexico based on increased agricultural production and the regional development of electric power possibilities. As the campaign developed, he had to contend with only one major opponent, his former fellow member in the cabinet, Ezequiel Padilla, a lawyer, former secretary of education, congressman, senator of the republic and, under Avila Camacho, secretary of foreign relations, internationally renowned as an orator. Padilla chose to make the revolution the chief issue of the campaign. The elections were held peaceably on July 7, 1946, under a reformed electoral law whereby the secret ballot was fully guaranteed.

In Jan. 1946 the P.R.M. had held a national convention which first resolved to change the nature of the party from the coalition of "sectors" already described to an institution open to all citizens accepting its program; the Institutional Revolutionary party (P.R.I.), as it was now named, then proceeded to nominate Miguel Alemán and to adopt as its platform the program he had elaborated in the course of a vigorous campaign.

On Sept. 12, 1946, the congress declared him president elect. On Sept. 22 this declaration was made solemnly throughout the republic, and on Sept. 21 the state department in Washington announced that President Truman had appointed Ambassador Walter C. Thurston to represent him at the inauguration ceremonies on Dec. 1, 1946, in Mexico City.

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Mexico City

Mexico City, the capital and largest city of the republic of Mexico, is located in the federal district, which is distinct from but almost surrounded by the state of Mexico. Population was estimated in 1945 to be 1,464,556. The census of 1940 credited Mexico City with a population of 1,448,422. The federal district, the other localities of which can for practical purposes be considered almost as suburbs of Mexico City, had a population of more than 2,000,000 (1,757,530, 1940 pop.). Mexico City is the oldest large metropolis in the hemisphere; unlike Buenos Aires, Rio de Janeiro, Lima and other important Latin American cities, and all those in the United States, it was an important pre-Columbian center, named Tenochtitlán. The historical and civic centre of the city is the Zócalo, a great plaza on which front the national palace, the cathedral and other important buildings. The cathedral is reputed to be the largest church edifice in North America. The older part of the city is east of the Zócalo, but is a relatively poor and obscure quarter. The principal business district is between the Zócalo and the Alameda (an extensive park), while residential building has spread from the Paseo de la Reforma district westward beyond Chapultepec Park to Chapultepec Heights. The decade 1937-46 saw an extensive development of workingmen's housing on the south side of the city. The renowned Chapultepec Park, crowned by the castle of the same name (occupied by Maximilian and Carlotta in the mid-1860s) is one of the show places of the city. Mexico City is the location of the National University of Mexico and many other prominent educational institutions.

Mexico City was the national centre of huge demonstrations in March 1938 expressing popular approval of the government's action in expropriating foreign oil interests. Minor disturbances occurred in the city during the presidential campaign in 1940 in which the major candidates were Gen. Manuel Avila Camacho (the winner) and Gen. Juan Andreu Almazán. Nabor Carillo, a prominent engineer, in an address to the national physical conference on May 8, 1943, predicted that Mexico City would sink into the earth unless remedial measures were taken promptly. He had reference to the fact that the city is located in large part on the lakebed of a large but shallow lake, not drained until long after the Spanish conquest. The insecure geologic foundation led to much settling of large structures. Municipal authorities in May 1944 bought a large electric floating fountain originally built for delivery to Rumania. Mexico City was the location in Feb.-March 1945 of the Inter-American Conference on Problems of War and Peace which, in the "Act of Chapultepec," laid down the bases for postwar hemispheric security. Police Chief Ramón Jiménez Delgado on May 15, 1945, reported the disappearance of a sum estimated at \$21,000,000 from the police fund.

Numerous disorders occurred in Mexico City during the presidential campaign in 1946 between Miguel Alemán and Ezequiel Padilla. (R. H. FN.)

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Mexico City Conference, 1945

See PAN-AMERICAN CONFERENCES, 1937-46; PAN AMERICAN UNION.

156 Meyer, Eugene

Meyer (1875-), U.S. publisher, banker and government official, was born Oct. 31, 1875, in Los Angeles. He was graduated from the University of California with a B.A. degree in 1895 and then studied finance and languages in Europe. On his return to the United States, he entered the banking field and organized the firm of Eugene Meyer, Jr., and company; he was its head from 1901 to 1917.

After the U.S. entered World War I in 1917, Meyer entered federal service as adviser on nonferrous metals to the Advisory Commission of the Council of National Defense and subsequently held this position with the War Industries board. In the succeeding years, he held the following posts: member of the National Committee on War Savings (1917), director and managing director of the War Finance corporation (appointed by Pres. Woodrow Wilson in 1918, and reappointed by Presidents Harding and Coolidge); member of the Federal Farm Loan board and Farm Loan commissioner (1927-29); governor of the Federal Reserve Bank (1930-33); and first chairman of the Board of the Reconstruction Finance corporation (1932).

In 1933, Meyer left the government service and bought the *Washington Post*. Six years after he took over the newspaper, its circulation tripled and it was regarded as one of the more prosperous and influential dailies in the east.

On June 4, 1946, Meyer was appointed first president of the International Bank for Reconstruction and Development. He resigned Dec. 4, 1946, declaring that he had accepted the post with the understanding that he would remain only until the bank was launched.

Mica

World production of mica is shown in Table I; in many cases the figures include some scrap and in some cases, especially the United States and Canada, represent more scrap than sheet. Hence, the data were not accurate as indications of production of the strategic grades of mica—block, sheet, films and splittings.

As may readily be seen from the data in Table II,

Table I.—World Production of Mica
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Argentina	248	276	328	487	596	689	443	206	76
Brazil (exp.)	364	574	480	1,231	956	955	877	1,037	1,086
Canada	945	519	1,068	975	1,743	3,010	4,025	3,342	3,685
India (exp.)	16,652	9,806	11,138	9,539	11,667	9,622	10,342	?	?
Madagascar	652	746	650	586	528	353	378	544	273
Norway	46	217	111	36	75	1,533	1,055	654	192
Portugal	—	—	—	—	?	?	241	1,300	?
South Africa	1,918	1,230	1,071	1,380	1,186	1,394	1,404	1,242	1,400
Spain	—	—	—	22	237	368	427	263	36
United States	26,043	20,727	25,079	23,199	33,833	44,643	47,862	52,489	33,529
Sheet	847	470	407	813	1,333	1,381	1,724	762	649
Scrap	25,196	20,257	24,672	22,386	32,500	43,262	46,138	51,727	32,880

Table II.—Data of the Mica Industry in the United States
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Sheet and punch									
Production	847.3	469.8	406.9	812.7	1,333.2	1,380.9	1,724.1	761.7	649.3
Imports	502.5	195.6	451.3	767.1	1,008.4	1,622.4	2,750.9	2,516.5	2,142.4
Available supply	1,349.8	665.4	858.2	1,579.8	2,341.6	3,003.3	4,475.0	3,278.2	2,791.7
Splittings									
Imports	3,966.4	989.6	1,341.8	3,693.2	5,844.7	6,824.7	8,450.4	2,045.8	3,499.7
Consumption	2,673.7	833.9	1,711.5	2,459.4	3,648.8	3,318.3	4,206.7	4,408.5	3,998.7
Stocks	—	—	—	—	7,239.8	10,059.7	12,017.9	8,197.6	3,887.5
Consumer	2,221.3	2,372.3	1,740.3	2,706.4	4,775.8	4,390.7	2,258.6	1,997.5	1,532.3
Government	—	—	—	—	2,464.0	5,669.0	9,759.3	6,200.1	2,355.2
Scrap									
Production	25,196	20,257	24,672	22,386	32,500	43,262	46,138	51,727	32,880
Imports	6,723	4,450	4,279	3,061	1,251	2,179	2,048	2,412	3,567
Available supply	31,919	24,707	28,951	35,447	33,751	45,441	48,186	54,139	36,447
Ground mica									
Production	27,245	27,086	30,924	27,984	43,419	46,979	51,582	52,713	48,224
Imports	41	85	159	120	98	467	418	265	191
Exports	1,532	1,394	1,500	706	880	723	479	415	749

the United States remained dependent on imports for the bulk of its supply, and not even the more than ten-fold wartime increases in price resulted in much improvement in the situation, even though the domestic output was more than doubled.

India supplied most of the U.S. imports of splittings and the largest share of sheet mica, with smaller amounts from Brazil, Canada, Argentina and Madagascar. With the drop in war demand Brazil took the lead in sheet mica, but India continued its supremacy in splittings.

India remained the world's largest producer of block and sheet mica, and with its abundant supply of raw material and of cheap labour, produced the bulk of the world's supply of splittings.

As the source of mica nearest the United States, the Canadian deposits more than trebled their output during World War II, but the figures shown in Table I include considerable proportions of scrap. For example, in the peak year, 1945, of the total output of 4,025 short tons, 3,033 tons were scrap and waste leaving 992 tons of the strategic grades.

Although Madagascar was an important prewar source of mica, operations there were restricted by war conditions, and production declined by half. As the only other sources of appreciable amounts in the western hemisphere, Brazil and Argentina expanded operations, especially the former.

(G. A. Ro.)

Micará, Clemente

Cardinal Micarà (1879-), archbishop of Apamea in Syria and apostolic nuncio to Belgium and internuncio to Luxembourg, was born at Frascati, Italy, on Dec. 24, 1879. As a young priest he entered the corps of papal diplomats, shortly reaching the rank of nuncio. Named nuncio to Belgium and internuncio to Luxembourg in 1923, he became dean of all apostolic nuncios. Following the German occupation of Belgium in 1940, Archbishop Micarà was expelled, together with other diplomats, and returned to Rome, where he remained throughout the World War II period, engaging in special work with the secretariat. He joined the Belgium exile government at London in the summer of 1944, and returned to Brussels after the liberation of the country. Pope Pius XII proclaimed him cardinal on Feb. 18, 1946.

Michael, King of Rumania

See MIHAI.

Michigan

One of the north central group of states, Michigan was the 26th state admitted to the union; popularly known as the "Wolverine state." Area 97,940 sq.mi. (including 39,960 sq.mi. of Great Lakes water surface); population (1940) 5,256,106; (estimate, Jan. 1, 1946, 6,100,000). Of the state's population in 1940, 3,454,867 were urban, 1,801,239 rural. Whites composed 95.9% of the population, nonwhites 4.1%; of the whites, 81.93% were

native-born, 18.07% foreign-born. Capital, Lansing (78,753). Larger cities were Detroit (1,623,452); Grand Rapids (164,292); Flint (151,543); Saginaw (82,794).

Shortly after his inauguration on Jan. 1, 1937, Governor Frank Murphy was faced with the responsibility of formulating a policy for meeting the most serious industrial crisis in the state's history. The sit-down strike begun in January at the Flint plant of the Fisher Body company, spread rapidly to other units of the General Motors corporation and took 140,000 employees away from their work. With Governor Murphy as mediator, a settlement of the strike was negotiated 44 days after its beginning. Strikes which broke out in March in other large automobile plants were similarly settled in April, but in the meantime the movement had begun to spread to other industries. The summer months witnessed an intensive struggle between C.I.O. organizers and the Ford Motor company; at the end of the year the latter was in conflict with the National Labor Relations board.

The state legislature in 1937 had a Democratic majority in the house and the members of the senate were closely divided along party lines. Significant enactments included laws placing the entire state government under civil service; requiring applicants for marriage licences to furnish certificates of freedom from venereal diseases; raising the standards for applicants to practise healing; effecting the consolidation under a single executive of prisons, probation and parole activities; consolidating the administration of various state institutions for the mentally ill; establishing the secret primary; making more effective collections under the sales tax; revising the state banking laws; liberalizing requirements for old age assistance.

In Aug. 1938 Governor Murphy called an extra session of the legislature to secure funds to meet relief demands. In the brief session, nine measures were passed, the three most important appropriating \$10,000,000 additional relief funds, amending the housing laws to extend to all cities and incorporated villages the privileges of receiving aid from the federal government, and extending the moratorium on mortgages and land contracts. The many changes inaugurated by the Murphy administration inspired peculiar interest in the Nov. 1938 election. Particularly acrimonious was the struggle for the gubernatorial nomination between Frank D. Fitzgerald and Harry S. Toy on the Republican side. With Fitzgerald's victory in the primary, a spirited campaign ensued between him and Governor Murphy, the principal issues of which were the handling of the sit-down strikes of 1937, the spending program of the Murphy administration, and in general, the "Little New Deal" in Michigan.

The election was decisive in outcome: the entire Republican ticket was swept into office. Fitzgerald received a plurality of more than 93,000 and Luren D. Dickinson, 79-year-old Republican, whose long career had already included six terms as lieutenant governor, was returned to office. Harry F. Kelly was elected secretary of state; Miller Dunckel, state treasurer; Vernon J. Brown, auditor; Thomas Read, attorney general. The Republicans also won 23 of the 32 senate seats and 75 of the 100 seats in the house. Upon expiration of his term, Governor Murphy was appointed by President Roosevelt to be attorney general of the U.S. By referendum the voters ratified a constitutional amendment restricting gasoline and motor vehicle licence plate taxes to street and highway uses and rejected three other proposed amendments.

It became evident early in 1939 that the Republicans planned sweeping changes with respect to economic and

social policies inaugurated by the Murphy regime as well as in the civil service program. Almost immediately, however, the Fitzgerald administration was embarrassed by widespread publicity given to the opening of numerous gambling establishments in the state. Governor Fitzgerald died, after a brief illness, on March 16, 1939 and Luren D. Dickinson became the state's 54th governor. Seventy-nine-year-old Dickinson, an active leader of the Anti-Saloon league, entered upon a vigorous campaign against sin as he saw it, which made him the most talked about governor in the state's history. Political observers were impressed with the uniformly large audience attending the Sunday religious rallies addressed by the governor in various parts of the state.

The legislature, in a session lasting until the middle of June 1939, passed nearly 370 measures. Perhaps the most important was a new civil service bill, which aroused bitter opposition from the Michigan Merit System association and other organizations. The measure removed from civil service about half the 16,000 positions which had been under the system at the beginning of the year. An oil control act drafted by the department of conservation was described by R. A. Smith, state geologist, as the best legislation of its kind in the nation. Other acts required an oath of allegiance of teachers, instructors and professors; provided for the raising of standards for nurses; abolished the legislative council established in 1933.

In the Nov. 1940 election, Wendell L. Willkie received 1,039,917 votes for the presidency and Roosevelt received 1,032,991. Murray D. Van Wagoner, Democratic nominee for governor, defeated Dickinson by 131,291 votes, marking the fifth instance in as many successive elections where the governorship passed from one major party to the other. Other choices were: lieutenant governor, Frank Murphy; secretary of state, Harry F. Kelly; attorney general, Herbert J. Rushton; treasurer, Theodore I. Fry; auditor general, Vernon J. Brown. The election returned strong Republican majorities in both houses of the legislature. A proposed constitutional amendment to liberalize the existing 15 mill limitation on assessments for school purposes failed of adoption; a civil service amendment providing for a broad merit system was adopted; a proposal for broader taxation of Detroit motor bus service outside the city was rejected; a proposal for strict regulation of dental advertising was adopted.

In the 1941 legislative session a deadlock occurred when the Republicans discovered, as they were preparing to adjourn in July, that they could not muster the necessary two-thirds vote to override any of 33 vetoes of the Democratic governor. The legislature then adjourned in recess for three months. When it reconvened in October, peace was negotiated with the governor, the Republicans being allowed to override 11 appropriation vetoes while the governor got his way on all policy-making vetoes. Laws were enacted providing for consolidation of most of the revenue-collecting departments, re-enacting regulations for milk-price fixing, implementing new constitutional amendments to provide "clean election" machinery, liberalizing the unemployment compensation act and making industrial sabotage a felony. In all, 382 laws were enacted; 116 were given immediate effect and 55 were added to that number when the legislature reconvened in October. However, the state supreme court ruled that in taking the latter step the legislature had exceeded its authority.

In the election of Nov. 1942 Judge Homer Ferguson (Rep.) defeated Senator Prentiss M. Brown (Dem.) for

U.S. senator. Gerald L. K. Smith, who ran as an "Independent Republican" candidate, polled only a few thousand votes. Michigan voters again chose to restore the governorship to the party in opposition: Harry F. Kelly (Rep.) defeated Gov. Murray D. Van Wagoner (Dem.). The Republicans obtained the election of their entire party slate. Dr. Eugene C. Keyes was elected lieutenant governor; Herman H. Dignan, secretary of state; Herbert J. Rushton, attorney general; Vernon J. Brown, auditor general; D. Hale Brake, treasurer. In the contest for justice of the state supreme court, Raymond W. Starr, incumbent, defeated Earl C. Pugsley (Rep.). With Republicans winning 25 of the 32 seats in the senate, and 73 of the 100 seats in the house, the position of the Democrats was left very weak—a condition intensified by Governor Van Wagoner's withdrawal from leadership in state politics.

An important industrial development in 1942 was the conversion of the huge automobile industry to war production. Existing facilities were utilized and a marked extension of resources occurred, the most conspicuous example being the opening of the Ford bomber plant at Willow Run. Thousands of state residents and out-of-state workers poured into Michigan manufacturing centres. According to U.S. census bureau estimates, the Detroit area by May 1, 1942 had a population of 2,750,000—an increase of 336,000 from the 1940 figure. The increase created acute housing problems, with numerous trailer and small-house communities springing up.

The 1943 session of the legislature, which met from Jan. to March, passed 265 measures, 9 of which were vetoed by Governor Kelly. Appropriations totalled \$137,000,000; a six-member state commission of labour and industry was created; for the first time since 1925, seats in the house were reapportioned; a new compilation of Michigan statutes were ordered; the Michigan council of defense was abolished and the direction of its system was transferred to a director of civilian defense (Capt. Donald S. Leonard); and for the first time in 30 years, the workmen's compensation law was revised. Governor Kelly's program for "streamlining" the government was deferred, but considerable authority for consolidating state agencies was entrusted to the newly created department of business administration headed by Robert S. Ford.

War production continued to play a dominant role in Michigan history in 1943. Population congestion was a contributing factor in bringing on the most significant event in 1943: the race riot which broke out in Detroit on June 20. Charges of corruption in the state legislature led to the initiation of a one-man grand jury investigation under the direction of Judge L. W. Carr. Republican candidates were uniformly successful in the April election: R. Spencer Bishop and Ralph A. Hayward were chosen regents of the state university; Eugene B. Elliott, superintendent of public instruction; Charles M. Ziegler, highway commissioner; Neil E. Reid and Emerson R. Boyles, supreme court justices.

A special session of the legislature was convened on Jan. 31, 1944: 15 members were under indictment of a special grand jury on charges of graft. Legislation for youth guidance included measures providing for the payment of full-time state salaries to county agents in counties with 30,000 or more residents and for revision of the juvenile code. For veterans the legislature set up a veterans' affairs bureau, provided for an educational and rehabilitation program, revised the unemployment insurance act,

and set up a \$1,000,000 veterans' reserve fund. For the postwar period, \$9,115,000 was appropriated for construction and repair of state-owned buildings. A war ballot bill was enacted, and the compulsory school attendance requirement was extended by one year. The grand jury investigation of the legislature continued; by the end of the year more than 50 men, a considerable number of legislators among them, had been named in its warrants; 20 had been convicted.

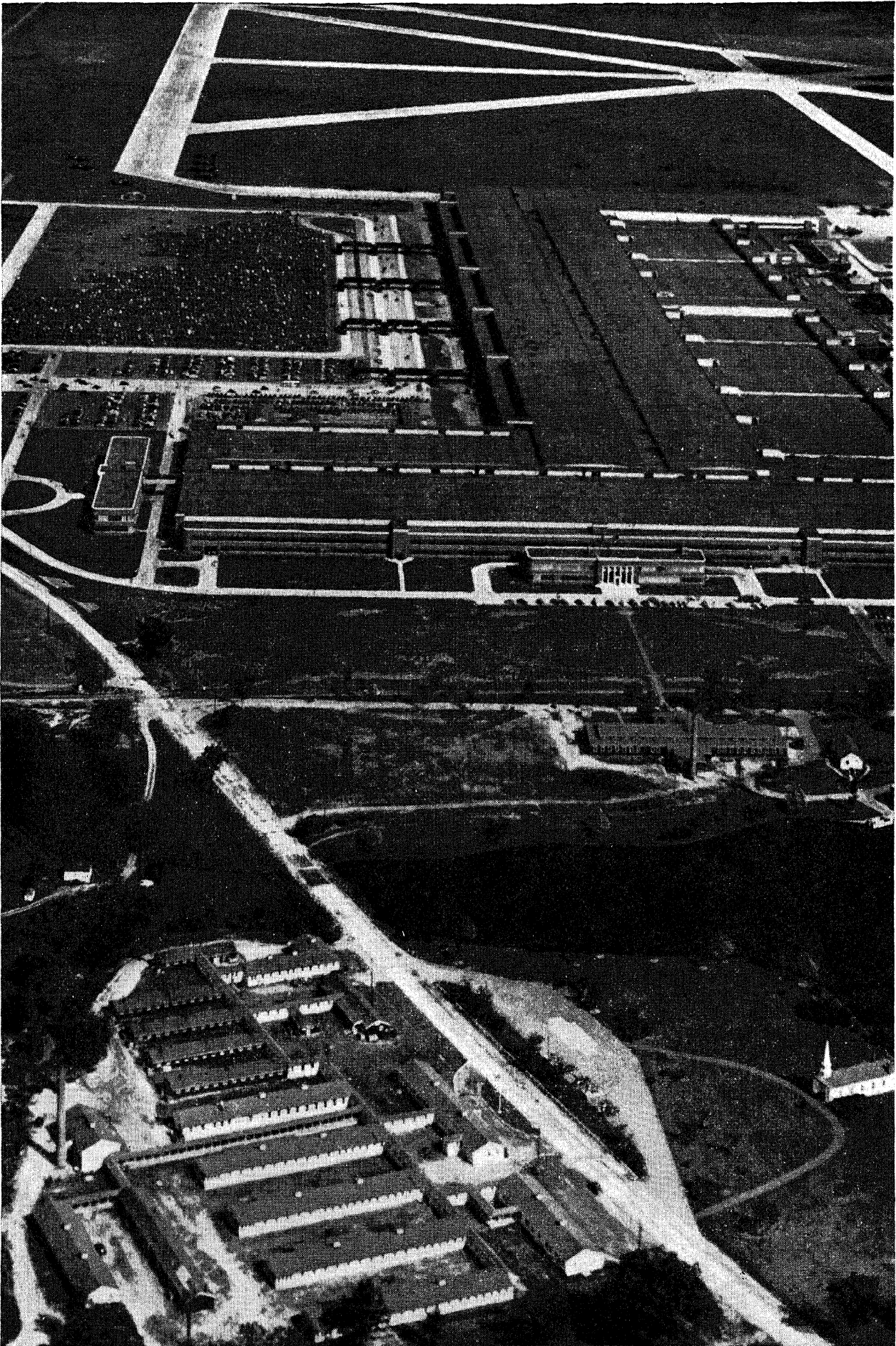
In the Nov. 1944 election, President Roosevelt carried Michigan by 22,476 votes, despite the fact that his opponent, Thomas E. Dewey, was a native son. This result was more conspicuous because all of the Republican candidates on the state ticket won by wide margins—Governor Harry F. Kelly won by a margin of 219,654, to become the first governor in 14 years to win immediate re-election. Other state officers were: lieutenant governor, Vernon J. Brown; secretary of state, Herman H. Dignan; attorney general, John R. Dethmers; treasurer, D. Hale Brake; auditor general, John D. Morrison. Republicans won 64 of the 100 seats in the house, 25 of the 32 seats in the senate; they won 11 of the 17 places in congress.

The regular 1945 session of the legislature convened at the beginning of the year and adjourned on April 26. Republican strength was reduced by three by the resignation of one member charged with graft, the murder of another and the failure of the third to occupy his seat, following conviction on the charge of conspiring to buy and sell votes. A total of 381 measures was passed. An annual budget of \$162,500,000 was adopted; new or increased taxes were placed on whisky, on bank accounts and other intangible property and on horse racing; a department of mental health was created; a Youth Guidance commission and a state department of aeronautics were established. A constitutional amendment to allow state participation in control of rivers and lake levels was adopted. Late in 1945 the governor called the legislature into special session (to meet in Jan. 1946), to deal particularly with the state's building program.

During the closing weeks of 1945, public attention throughout the country was concentrated on the huge strike in the General Motors plants (Detroit, Flint, Pontiac, Lansing, Grand Rapids and other cities). Other automobile plants also experienced production difficulties; total automobile production in Michigan during the year was less than 15% of that anticipated in early fall. In the spring election, Justices Raymond W. Starr and Walter H. North were elected to succeed themselves, as members of the supreme court; Charles M. Ziegler was re-elected state highway commissioner; Eugene B. Elliott, superintendent of public instruction. Total state revenues for 1944-45 were the highest in history, amounting to \$258,232,442. The combined surplus on June 30 was \$79,034,932. The state's wealth was revealed by the fact that with only 3.2% of the population of the United States, its federal tax load was nearly 6% of that levied in the country.

In a four-way contest in the primary election on June 18, 1946, Kim Sigler, formerly a Democrat, received approximately 38% of the votes cast for the Republican nomination to the office of governor, having a plurality of 48,000 votes over his nearest rival. In the Republican nominating convention a few weeks later, Sigler presented for nomination to the four administrative offices to be filled, a slate

Willow Run, Michigan, showing the huge bomber plant built by the Ford Motor company in 1941-42. The plant was converted to the production of automobiles and agricultural machinery after the close of World War II



including the name of but one of the incumbents. The other incumbents, all candidates for renomination, were rejected in the triumph of the Sigler slate.

In the election of Nov. 5, 1946, Sigler defeated the

Michigan: Statistical Data

Table I.—Education (Public)

	1938	1940	1942	1943	1944	1945
Elementary pupils . . .	723,757	973,737	582,263	950,000	581,293	588,501
High school pupils . . .	236,070		388,041		341,764	346,643
Elementary teachers . . .	20,741	32,716	19,611	32,492	19,282	18,626
High school teachers . . .	11,542		12,881		12,670	11,965

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1938	1940	1941	1942	1943	1944
Recipients of old-age pensions	70,872	73,302	88,768	92,134	87,784	85,177*
Cost of old-age pensions	\$1,213	\$1,239	\$1,521			
Dependent children receiving aid	28,478	45,797	50,768	47,230		
Blind receiving aid	675	863	1,244	1,384	1,290	1,250
Workers under unemployment compensation	900,907	1,064,400				

*September lowest number of cases during the year.

Table III.—Communications

(Money figures in thousands of dollars)

	1937	1938	1939	1940	1942	1945
Highway mileage		9,390	9,292	9,242	9,595	
Expenditure on highways	\$30,021	\$25,228	\$24,571	\$67,403	\$60,925	\$51,000
Railroad mileage	7,438	7,352	7,352		7,438	

Table IV.—Banking and Finance

(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1945
State revenue	\$193,000	\$217,480	\$198,287			
State expenditure	\$162,431	\$169,645	\$208,896			
State gross debt	\$ 94,040			\$82,314	\$89,140	
Number of national banks	83	82	82	76		75
Deposits of national banks	\$767,793	\$764,454	\$877,081	\$1,063,026		

Table V.—Agriculture

(All figures in thousands)

	1937	1939	1940	1942	1944	1945
Acreage	7,714	7,492	7,707	7,940	8,133	8,254
Income from crops and livestock	\$244,600	\$215,733	\$233,264		\$500,000	\$500,000
Leading crops (bu.):						
Apples	8,500	10,501	5,967	9,234*	7,625	1,250
Barley	4,545	5,771	5,796	7,293	3,900	3,906
Corn	55,650	58,830	49,856	69,703	57,760	61,915
Hay (tons)	3,512	3,436	4,064	3,926*	3,376	3,846
Oats	40,642	42,712	60,489	67,410	44,100	64,400
Peaches	2,652	2,760	1,682		3,600	3,848
Potatoes	18,031	17,336	15,054	16,562	18,360	18,700
Wheat	18,658	15,784	17,812	16,322	22,992	27,648
Beans (100 lb. bags) . . .	4,333	4,850	4,309	6,124*	4,158	3,247

*Estimated.

Table VI.—Manufacturing

(Money figures in thousands of dollars)

	1937	1939
Wage earners	660,676	522,242
Wages paid	\$986,841	\$789,976
Value of manufactures:	\$5,296,101	\$4,348,223
Motor vehicles	\$1,613,226	\$2,284,667
Motor vehicle bodies and parts	1,313,377	
Steelworks and rolling mills	130,888	99,940
Foundry products	114,463	
Paper	92,418	89,113
Refrigerators	75,967	51,806

Table VII.—Mineral Production

(All figures in thousands)

	1937	1939	1941	1942	1943	1944
Value mineral production	\$119,168					
Leading products:						
Iron ore	\$41,136	\$37,026	\$43,765	\$45,600	\$40,258	\$38,537
Petroleum	21,950	21,350	21,900	30,000	29,300	26,600
Iron, pig	15,064	18,872	21,384	25,718	24,782	
Coke	13,816	12,409	18,213	21,794	22,007	24,849
Cement	9,837	10,892	13,334	14,684	9,286	7,733
Copper	11,486	9,149	10,960	11,054	12,159	11,454
Natural gas	5,640	7,411	8,722	11,044	12,430	13,622
Salt	6,506	6,727	10,976	12,584	14,473	14,922

Democratic nominee, former-Governor Murray D. Van Wagoner, by a plurality of more than 350,000 votes—the largest ever accorded a Michigan governor in a nonpresidential year. The entire Republican state ticket was swept into office. Eugene C. Keyes became lieutenant governor; Fred M. Alger, secretary of state; Eugene F. Black, attorney general; D. Hale Brake was re-elected state treasurer; Murl K. Aten became auditor general.

Three proposed amendments to the state constitution were ratified by the voters in the election. A proposal that one-third of the sales tax levy should go to local governments and school districts carried by a 64 margin. By a slightly smaller margin, the voters granted a veterans' bonus providing for a maximum payment of \$500, based on \$10 monthly for domestic and \$15 monthly for overseas service between Sept. 16, 1940 and June 30, 1946. Nearly 70% of the voters approved of a proposal to permit the state to engage in the development of harbours of refuge, airports, drainage and other internal improvements.

Adoption of this amendment permitted the release of \$1,000,000 held by the state in escrow for airport building; this money was to be matched by federal funds.

(L. G. V. V.; X.)

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Microphotography

See LIBRARIES; PHOTOGRAPHY.

Microscope, Electron

See INDUSTRIAL RESEARCH; PHOTOGRAPHY.

Midway Islands

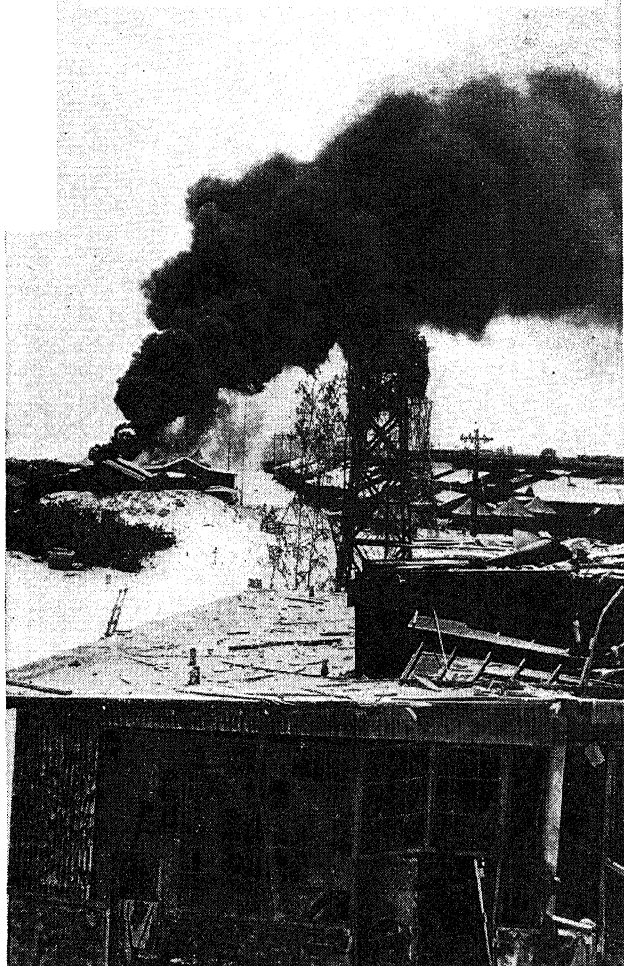
Midway consists of two small islands, Sand and Eastern, plus numerous islets, surrounded by a coral reef five miles in diameter; these islands comprise 850 and 328 ac. respectively.

Captain N. C. Brooks in the Hawaiian bark "Gambia" was presumably the first to discover these islands, on July 5, 1859. Captain Brooks, finding no native population, took possession of the islands in the name of the United States and named them Brooks Islands. However, it was not until 1867 that the United States government made formal claim. At that time the name was changed to Midway, designating the mid-position of the islands between the United States and Japan. In 1869, an initial congressional appropriation was made to improve the harbour at Midway, but the project was later abandoned as too costly.

For many years thereafter, only slight attention was given to Midway. In 1903 it was declared a U.S. naval reservation by President Roosevelt and placed under the secretary of the navy for purposes of administration. In the same year Midway was made a connecting point for the cable lines being laid from Hawaii to the Philippines.

It was not until the advent of air transportation that the real significance of Midway was appreciated. In 1935 the islands became a regular stop over point for commercial transpacific flights.

It was World War II, however, which conclusively demonstrated the strategic importance of Midway. The possession of these tiny islands formed a very important part of the strategy of the Japanese forces. It was recognized that if Midway could be utilized as a Japanese out-



Black smoke rising from a burning oil tank on Midway during the Japanese attack of June 1942

post, not only could Hawaii, only 1,100 mi. to the southeast, be made untenable for the United States forces, but the all-important supply lines to Australia could be cut off, thereby permitting the uninterrupted conquest by the Japanese of Australia and the islands of the south and southwest Pacific.

Two serious attempts were made by the Japanese to capture Midway. The first effort was on the evening of Dec. 7, 1941, when the attacking forces were repulsed with severe losses after a heavy engagement. The second attack, which culminated in the great battle of Midway, in June 1942, marked a turning point in the war in the Pacific.

Battle of Midway, 1942.—The battle of Midway began on the morning of June 3, 1942, when a considerable Japanese force was sighted several hundred miles southwest of Midway following an easterly course. The composition of the force was not determined immediately, but it was clearly a large attack force with supporting vessels. Late in the afternoon of that day this force was bombed by a squadron of B-17s. While the results of the attack were not definitely determined, hits on several ships were scored. On the morning of June 4, contact was made with Japanese aircraft headed toward Midway, and immediately thereafter, two carriers and the main Japanese forces were sighted in the same vicinity. The Japanese air attack force was subjected to heavy fire and the Japanese plane losses were considerable. Meanwhile, army, navy and

marine corps planes from Midway attacked the Japanese carriers, battleships and other vessels in the invading force, inflicting serious damage to one carrier.

At this point, United States carriers took a hand in the engagement. The famous Torpedo Eight squadron from the "Hornet" attacked a force of four Japanese carriers. This squadron was without the protection of fighters, and without accompanying dive bombers. All the planes were shot down and only one pilot survived, but the squadron made several hits on the Japanese carriers.

About an hour later, torpedo squadrons from the "Enterprise" and "Yorktown" attacked the same carriers, and also suffered losses, but registered hits on two carriers. These attacks were followed by dive bombers from the "Enterprise" which smothered two carriers. In the meantime, more bombers from the "Yorktown" had hit a third carrier, a cruiser and a battleship. Two carriers had been set on fire and put completely out of action. A third was damaged and was later sunk by the submarine "Nautilus."

Planes from the only Japanese carrier remaining undamaged attacked the "Yorktown," and although this attack force was annihilated, it succeeded in making three bomb hits. Shortly afterward, Japanese torpedo planes scored two hits on the "Yorktown" and orders were given to abandon ship. About two hours later planes from the "Enterprise" attacked the undamaged Japanese carrier and left it a mass of flames. Immediately thereafter, when a squadron from the "Hornet" arrived, the carrier was blazing so furiously that it was possible to concentrate on a nearby battleship and a cruiser, both of which were hit.

At this stage of the engagement, it was apparent that control of the air had been won by the American forces. Other U.S. planes scored hits on a battleship, a damaged carrier and a destroyer. By the end of the day the Japanese were in full retirement.

On the morning of June 5, aircraft from the "Enterprise" and the "Hornet" made an ineffective attack on a Japanese light cruiser, but planes from Midway discovered two Japanese cruisers, one of which was left in a crippled condition. Poor visibility prevented further operations.

On June 6 "Hornet" planes located a Japanese force consisting of two heavy cruisers and three destroyers and made hits on the two cruisers. Planes from the "Enterprise" also scored hits on those two cruisers and later in the day "Hornet" planes successfully attacked two more cruisers and a destroyer.

On the same day, in an effort to save the "Yorktown," which had been taken in tow, the destroyer "Hammann" went alongside to put on board a salvage party. While she was alongside, the "Yorktown" was struck by two torpedoes and the "Hammann" by one. The "Hammann" sank within a few minutes and the next morning the "Yorktown" also sank.

The battle of Midway was the first decisive defeat suffered by the Japanese navy since 1592, when Korean Admiral Yi-sun administered a resounding defeat to the Japanese Admiral Hideyoshi, so-called father of the Japanese navy, off the Korean coast. It also put an end to the long period of Japanese offensive action and restored the balance of naval power in the Pacific. From that time forward the initiative was taken by the United States forces. (See also PACIFIC ISLANDS, U.S.; WORLD WAR II.)

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162 Mihai (Michael)

King Mihai I of Rumania (1921–), was born at Sinaia on Oct. 25, 1921. He first ascended the throne in 1927 under a regency when his grandfather, King Ferdinand, died; Carol, his father and the heir apparent, had renounced the right of succession because of his affection for the commoner, Magda Lupescu. In 1930 Carol recanted this decision, however, and returned to Bucharest to be crowned. Mihai again became king on Sept. 6, 1940, when Premier Ion Antonescu forced Carol to vacate the throne after a disastrous summer in which Rumania lost most of the territory ceded to it after World War I. Princess Helen, Mihai's mother and Carol's former wife, returned to Bucharest, and even the Iron Guard endorsed the transfer of the crown. Under Mihai's reign, Rumania signed the anti-Comintern pact with Germany in Nov. 1940, and declared war against the soviet union the following year. The long period of German occupation eventually led to an anti-axis movement, with which the king was known to sympathize. On Aug. 23, 1944, with Russian troops entering Rumania, Mihai officially broke with the axis, overthrew the government of Premier Antonescu, and announced restoration of the liberal constitution. He signed the armistice with the United Nations on Sept. 13, 1944.

Mikhailovitch, Draja

Mikhailovitch (1893–1946), Yugoslav soldier, was born at Shumadija, near Belgrade. He fought in the Balkan War (1912–13) and in World War I, in which he was thrice wounded, decorated for bravery and was promoted to a captaincy. He then attended the higher military academy and the general staff school.

Following Germany's conquest of Yugoslavia in April 1941, Mikhailovitch fled to the mountains, where he welded Yugoslav resistance elements into a strong guerrilla army. His initial operations against the axis were successful, and he was made minister of war by the Yugoslav government-in-exile. In early 1943, however, Mikhailovitch apparently restricted his operations, and his Chetnik followers clashed frequently with the Yugoslav partisans, a rival organization headed by Marshal Josip Broz (Tito). In the ensuing battle for political control of Yugoslavia, Tito won Allied support. Under British pressure, King Peter himself was forced to disavow Mikhailovitch and announced (May 20, 1944) his removal as minister of war. After the war, Mikhailovitch went into hiding, but was captured in a mountain cave on March 13, 1946, by Yugoslav authorities and was held for trial on charges of treason and collaboration with the axis. During his trial, which opened June 10 in Belgrade, Mikhailovitch admitted some charges that he personally collaborated with the axis, but later retracted this admission, saying that he had been too exhausted by the severe grilling to know what he was saying. After a lengthy trial, he was found guilty (July 15) and together with eight other Yugoslavs was executed in Belgrade by a firing squad on July 17, 1946.

Miklas, Wilhelm

Miklas (1872–), Austrian politician, was born on Oct. 15, 1872, at Krems. Educated at Vienna university, he became a teacher and later headmaster of Horn public school. In 1907 he was elected to parliament as a Christian-Socialist. He was state secretary for education in 1919 and president of the national council in 1923. In 1928 he

was elected president of the republic and was re-elected in 1931. By inviting Engelbert Dollfuss to form a ministry in 1932, he unwittingly ushered a semidictatorship into Austria. When Dollfuss was murdered by nazis in 1934, Miklas acquiesced in the arrangement whereby Kurt von Schuschnigg took over the government. In Feb. 1938, with Italian support of Austrian independence withdrawn, and under duress from Germany, President Miklas reluctantly signed the Austro-German agreement which gave control of the police to the Austrian nazi minister of interior, Arthur Seyss-Inquart. Early in March, following the plebiscite proposal and an angry ultimatum from the German government, President Miklas, yielding to what he described as "brute force," dismissed Schuschnigg as chancellor and appointed in his stead the German protege, Seyss-Inquart. On March 13, the occupation of Austria by German troops having been completed, President Miklas resigned at the request of Seyss-Inquart.

Mikolajczyk, Stanislaw

Mikolajczyk (1901–), Polish politician, was born in Gelsenkirchen, Germany, the son of a farm labourer who emigrated from Poznan province in western Poland to find work in the Westphalian mines. After the family returned to Poland, Mikolajczyk became active in political organizations. He was wounded during the Russo-Polish war in 1920. After the war, he entered politics and at the age of 29 was elected to the Polish parliament, the Sejm, where he served from 1930 to 1935. He was vice-president of the anti-German Polish Peasant party and was made its president in 1937. When the nazis invaded Poland in Sept. 1939, he saw military action in the unsuccessful defense of Warsaw. He fled to Hungary and later escaped to France. He became President Paderewski's deputy in the Polish parliament-in-exile, and succeeded to the presidency on Paderewski's death in 1941. When Premier Wladyslaw Sikorski was killed in a plane crash in July 1943, Mikolajczyk became premier. He sought a settlement of the Polish boundary dispute with the soviet union, and in 1944 conferred in Moscow with Premier Stalin on this issue. Mikolajczyk's efforts to achieve a settlement were futile, and he resigned on Nov. 24, 1944. Accepting the invitation of soviet leaders in Moscow to help in the reorganization of the Polish cabinet in accordance with the Yalta agreements, he joined the new Warsaw government as deputy premier on June 23, 1945. Mikolajczyk later accused the government of suppressing the Peasant party and fostering a one-party dictatorship.

Milch, Erhard

Milch (1892–), German soldier, was born at Wilhelmshaven on March 30, 1892. He studied at Danzig Technical high school and Koenigsberg university. During World War I he became an army pilot and was advanced to flight general. After the war he became a commercial pilot. He had long been a friend of Goering, and when the nazis came into power in 1933 Milch was made secretary of state in the air ministry. In this capacity he founded the Air Sport league and the Hitler Flying Youth. In 1935 he began the task of building Germany's embryonic air force into an armada of fighting planes. Putting his faith in mass output, Milch confined production to only a few standardized models and was thus able to procure thousands of planes in less than five years. Promoted to colonel general in 1938, he was created field marshal by Adolf Hitler on July 19, 1940. He was also chairman of the Deutsche Lufthansa, Germany's national air line. In Nov. 1942 he was appointed a member of the war

Military Academy, U.S.

From 1937 to the end of 1941 there were no radical changes at the U.S. Military academy, West Point, N.Y., though the academic and military courses continued to undergo the customary minor alterations necessary to keep them abreast of progress.

The attack on Pearl Harbor was immediately reflected in planning, looking toward greater demands that might be made in order to increase the military academy's contribution to the war effort. The academic board, with the advice and assistance of a board of consultants consisting of civilian educators and experienced army officers, drew up a condensed, three-year curriculum. Plans for air corps branch training, early graduations and more intensified tactical training were prepared. By foresight, the academy was ready to put the demands of the war department in effect without confusion or delay.

The following are some of the changes and accomplishments of the war years from 1942 to 1945: The authorized strength of the corps of cadets was raised from 1,960 to 2,496. Two classes were graduated early, and the course was reduced from four to three years. Stewart field and three auxiliary flying fields were developed, and the necessary facilities constructed, so as to carry out the plan for air corps training at West Point. During the war 825 cadets were graduated with their pilots' wings. A large training and manoeuvre area, known as Camp Simon Bolivar Buckner, was developed near by and utilized to provide practical exercises in mechanized and amphibious warfare. Joint manoeuvres with a wartime division at Pine Camp, N.Y., were conducted at the end of each summer. Academic work was also intensified. Regular officers were released to combat units as far as possible, and instructors to replace them were selected from retired, reserve, national guard and specially commissioned officers. Academic work was intensified. German and Portuguese were added to the French and Spanish already taught. By June of 1945, the wartime academy had graduated 2,624 officers.

In Sept. 1945 reversion to a four-year curriculum was announced. As before, a board of consultants was called in to advise. Transition courses were put into effect immediately, but complete conversion could not be accomplished until the 1946-47 academic year. The new curriculum placed increased emphasis on cultural subjects and embodied the lessons learned during the war. The course in modern languages was further augmented by Russian. A course in geography and a more thorough study of international relations and the economics of war were provided. Electronics, communications and nuclear physics were more adequately covered. Military psychology and development of leadership were stressed. Close liaison with the naval academy was emphasized, and joint amphibious manoeuvres with the midshipmen were planned for the summer of 1946.

(For statistics of enrolment, faculty, library volumes, etc., see UNIVERSITIES AND COLLEGES.)

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(M. D. T.)

Military and Naval Forces

See AVIATION, MILITARY; COMPULSORY SERVICE, BRITISH; LAW; NAVIES OF THE WORLD; SELECTIVE SERVICE, U.S.; WORLD WAR II; see also under individual countries.

Military Government, Allied

See ALLIED MILITARY GOVERNMENT.

Military Medicine

Extensive use of blood and blood substitutes, advances in the sulfonamides and penicillin, improved means of protection against disease-bearing insects, development of new techniques in surgery and revision and modernization of organization in the collection and evacuation of casualties were among the significant advances in military medicine which crowded the decade 1937-46.

Liberal use of blood and blood substitutes probably did more to save life during World War II than any other single factor, since loss of blood, unless promptly arrested, quickly leads to death. Tourniquets and bandages had reduced the hazards of haemorrhage somewhat, but until 1940, when blood plasma was first employed on a large scale, loss of blood and shock were the primary causes of death in wars. From the experience gained during the Spanish Civil War it was evident that large stores of plasma would be needed for future hostilities. Special centres were established in different countries by the Red Cross or civilian medical agencies. The public was asked to go to designated places and give blood. Cities established blood donor centres, while rural and small urban communities were served by automobile caravans that acted as mobile donor centres. The numerous accounts of the beneficial effects of blood plasma testified to its life-saving value.

After severe loss of blood, however, recovery was found to be much more rapid when whole blood was given. By 1945, means were perfected to have whole blood available in limited quantities for use on the battle fronts. About 1,000 pints of group "o" blood, the universal type, were procured from blood donor centres at Boston, New York and Washington daily for use at the European fronts. Blood was drawn, typed, processed and flown to special centres behind the lines. Various preservatives were employed so that whole blood could be safely used without fear of transfusion reaction 18 days after it was taken from the donor. Special cartons enabled suitable refrigeration in the flight across the ocean. Free and ready use of blood and blood plasma were significant reasons for the reduction of deaths from wounds from 8% in World War I to less than 3% in World War II.

Use of Sulfa Drugs.—Sulfonamides (the sulfa drugs) played an important part in the treatment of wounds and diseases. Most war wounds were infected wounds, since fighting involved intimate contact with the earth or was associated with debris, fragments or clothing which contaminated wounds. Early administration of one of the sulfonamides was an effective means of reducing the extent and severity of injuries. First-aid packets were prepared with sulfanilamide and sulfathiazole to be sprinkled over the open wounds. Careful studies by the National Research council showed that "frosting" wounds with a sulfonamide did little to promote wound healing, while taking sulfathiazole or sulfadiazine by mouth was of real value in preventing the spread of an infected wound and in promoting healing. Significant reduction was noted in the

mortality from pneumococcus pneumonias after the use of adequate amounts of sulfadiazine. During World War I the death rate from all forms of pneumonia was 28%, while in World War II it was 0.7%. Meningococcus meningitis was a serious disease in World War I, with an incidence of 1.3 per 1,000 per annum in the U.S. army and a mortality of 34%. During World War II the admission rate fell to 0.9 per 1,000 and the mortality to 4%. There was no evidence that the disease was less severe in World War II, but the effectiveness of sulfadiazine was amply demonstrated. Certain upper respiratory infections were curtailed by the use of small amounts of sulfadiazine. Special studies made both in large army and navy installations showed conclusively the beneficial effects of small prophylactic doses of the sulfonamides during the winter season. Sulfonamides reduced noneffective rates among troops and lessened the recurrences of rheumatic fever.

Penicillin and Streptomycin.—Antibiotics were even newer healing agents. Penicillin (*Penicillium notatum*), an extract of a common mould, was used in a wide variety of conditions. It prevents growth of bacteria, especially in all coccal infections, such as osteomyelitis, infected wounds, burns, meningitis, pneumonia and endocarditis. Gas gangrene was also benefitted by the use of penicillin, and Clostridia infections in World War II were relatively few compared to earlier wars. Venereal diseases, long the scourge of armies, did much less damage following the use of sulfonamides and penicillin. Injections of penicillin brought about astounding results in cases of acute gonorrhoea. Those who were not cured in a single course of treatment were given a second course with great improvement. Syphilis was also treated by rapid methods with penicillin. Complications of venereal diseases which formerly caused prolonged hospital care or treatment were rarely observed after extensive employment of sulfonamides and penicillin in acute infections.

Streptomycin, another antibiotic, is a substance obtained from soil micro-organisms. It was found of value in bacterial infections, including pneumococcus pneumonia, Friedländer bacillus pneumonia, beta streptococcus septicaemias and infections with *Escherichia coli* and staphylococci.

Modern preventive medicine made it possible to send U.S. troops all over the globe without fear of undue losses from infections and tropical diseases. A detailed program of inoculations and immunizations was drawn up by the army and navy. Soon after induction into the army of the United States, each soldier was given a smallpox vaccination and injections that protected against typhoid fever, tetanus and paratyphoid A and B. Prior to the soldier's departure for overseas duty and depending upon the area of service, he was inoculated with material which protected him from cholera, plague, yellow fever and typhus fever.

Typhus Fever.—Typhus fever, an aftermath of wars and famines, was a potential threat to the health of Allied armies during World War II. Two main types were encountered—epidemic typhus, spread by the louse (*Pediculus humanus*) and found in the Mediterranean region and elsewhere, and endemic or murine typhus, spread by rats and rat fleas and found mainly in the South and Southwest Pacific areas. Before the fall of Naples it was known that epidemic typhus was present among the civilian population of Italy. In 1943 the United States of America Typhus commission was created to study means of preventing and curing the disease. Immediately after the

Allied armies entered Naples the U.S.A. Typhus commission, in co-operation with the Rockefeller Foundation Health commission, Allied military governments and the medical departments of the army, navy and public health service, undertook a vigorous program to stamp out typhus fever. The epidemic was controlled within several weeks, and there were less than 50 cases in the U.S. army personnel, with no deaths. Improved vaccines were of some help in the protection of immunized soldiers.

Previous aerial bombardment of Rome had driven the civilian population to seek shelter in air raid refuges where the disease spread quickly. Crowding, lack of bathing and laundry facilities combined to make it easy for the body lice to go from person to person, thus spreading the disease.

All acutely ill patients were sent to hospitals promptly and delousing of the rest of the population was begun. A hand-operated spray gun was found to be most effective. The active insecticide DDT (dichloro-diphenyl-trichloroethane) was mixed with talcum powder and inserted in the cylinder of the duster. A long nozzle made it possible to dust all parts of the body where lice usually reside and made the operation of the hand spray so easy that about 20 persons could be treated with 1 lb. of DDT. The average field worker could delouse 200 to 400 persons per day after a system had been established. The entire population was dusted so that the body lice were killed, and the epidemic promptly stopped.

Para-aminobenzoic acid was reported to be of some value in the treatment of louse-borne typhus fever.

Scrub typhus (tsutsugamushi fever), a condition similar to typhus though a distinct disease, was a problem in the orient. It was spread by the chigger or mite of the family of Trombicula which passed the infected Rickettsiae. In New Guinea, Burma and elsewhere in the orient the mites seemed to be associated with the tall kunai grass fields bordering streams and water courses in the jungle. Infection among troops usually took place during the first four to six weeks after a unit occupied a camp site. Careful selection of camp sites, cutting and burning of kunai grass with oil and preparation of the ground by advance units equipped with leggings and specially impregnated clothing which repelled chiggers were effective means of reducing the incidence of scrub typhus among soldiers. Sprays of DDT and other insect repellents were useful in killing the infected mites. Sleeping on the ground was reduced to the minimum, and cots were provided whenever possible in an effort to avoid contact with chiggers. Floors for tents, barracks and hospitals were raised three to four feet above the ground and thoroughly sprayed with DDT to minimize infection. Soldiers exposed to a mite bite were instructed to take a bath at once with thorough soaping and scrubbing of the skin with a rough towel.

Malaria.—Malaria was a serious problem to military surgeons throughout World War II. The conquest of malaria was achieved largely through the extensive use of DDT, sanitation and use of atabrine and quinine. Among troops stationed in regions where malaria was widespread, this disease was often the most common cause of death and illness. Control depended upon the region, the military situation and the availability of men and supplies for anti-malarial measures. In fixed installations reliance was mainly on improved sanitary engineering. Drainage was established, underbrush cut from the banks of streams or lakes and all small accumulations of water filled or regularly oiled or sprayed. In certain tropical island bases, these measures were so effective that there was a nearly

complete eradication of mosquitoes. Screening and bed nets were also important means of reducing malaria.

Favourable situations made it possible to spray an area with DDT by aeroplane prior to military operations and thus reduce the occurrence of malaria among front line troops. A solution of 5% DDT in medium fuel oil sprayed at the rate of 0.3 to 0.6 lb. DDT per ac. gave excellent results. Adult and larval forms of mosquitoes were controlled by the fuel oil DDT mixtures. Sprays of kerosene with 5% DDT were also found useful in hand and power sprayers as additional means of reducing the breeding of mosquitoes.

Considerable stress was given to individual protective measures against malaria. Soldiers and sailors received intensive group instruction regarding the means of transmission of the disease, dangers commonly encountered, use of the freon bomb and the value of taking small daily doses of atabrine. A combination of wearing protective clothing, daily spraying of bunks, proper use of mosquito nets and prophylactic dose of atabrine resulted in remarkable reduction of malaria even among units engaged in combat.

The control of disease-laden mosquitoes was so effective that many tropical diseases which were formerly hazards became of inconsequential importance during World War II. Dengue fever, transmitted by *Aedes* mosquitoes, sand-fly fever or pappataci fever, transmitted by *Phlebotomus papatasi*, and filariasis, transmitted by *Wuchereria bancrofti*, were fairly well controlled by DDT and sanitary measures. Soldiers who did contract filariasis were returned home to prevent reinfection.

Atabrine was required to be taken by all troops stationed in areas considered malarious. Usually 0.1 to 0.2 grams were given daily, and this treatment held the number of cases of malaria to a fraction of the number that would have occurred had no medicine been given. Limited quantities of quinine were available to the Allies during World War II, and it was used by persons who could not tolerate atabrine or in severe cerebral forms of malaria. Experience showed atabrine to be a safe, effective means of preventing certain forms of malaria.

Infectious Hepatitis.—Infectious hepatitis, which caused considerable disability among troops, had been demonstrated to be a virus disease and was believed by some to be transmitted by water. Patients with the disease excreted the virus in their stools, and it was suggested that contamination of the water supply followed. Treatment of water containing the virus with chlorine did not inactivate the disease-producing agent. Studies were made to ascertain practical methods of completely inactivating the virus, and indications suggested that a modification of existing methods of water purification would be required to complete the task.

Infectious hepatitis was encountered in troops stationed in various parts of the world. Many cases were reported from Italy and the Philippine Islands. The disease was easily recognized when medical officers were on the alert for it. Early gastrointestinal symptoms, such as nausea, belching, gas and pain, were part of the initial symptoms. Vague pains throughout the body and fever completed the clinical picture. High carbohydrate diet, complete bed rest and transfusion of matched blood from donors who had recovered from the disease did much to reduce its seriousness. Intramuscular injections of gamma globulin were found to be useful in prevention.

Surgical Advances.—Medical advances were responsible for improved methods of treating war wounds and reducing death and sickness rates. Early and careful *débride-*

ment—that is, careful surgical trimming of the edges of wounds to remove all dead or infected tissues—was found helpful in many instances. An evacuation hospital near the front in the Southwest Pacific had the opportunity to compare the results of débrided wounds with those not trimmed. Forward medical officers carefully débrided wounds early, dressed them, gave the patients sulfa drugs by mouth and immobilized the wounded parts prior to evacuation. The wounded arrived at the evacuation hospital in good condition and made an early convalescence, despite the fact that many had been on lean rations for weeks and had been through an active campaign involving arduous physical exertion.

A second group of patients was treated at forward medical units by sulfanilamide dusting. Wounds were cleansed and crystals of sulfanilamide were sprinkled over the wounds which were then covered with sterile dressings. Upon arrival at the evacuation hospital many of the patients had fevers of 102° to 104° F. More than half of the patients required extensive *débridement* at the evacuation hospital. It was felt that early and careful trimming of the wound edges was of distinct value in promoting the earliest possible healing in that theatre of war.

Immobilization of wounded parts played an important part in healing war wounds. Years before Dr. H. Winnett Orr had pointed out the value of the closed plaster of Paris casts in fixing the injured parts and facilitating early healing. During the Spanish Civil War, Major Josep Trueta used the technique of early suture and closed plaster of Paris casts with excellent results. Pain, shock and delayed healing were avoided by proper fixation of the injured parts. The method was found applicable to fractured bones and large muscle and skin wounds. Plaster of Paris casts enabled hospital corpsmen, orderlies and litter bearers to move and evacuate patients easily to rear areas. Patients with primary suture,—early closure of fresh wounds by catgut or silk sutures,—had to be carefully watched for signs of infection. Casts were frequently split three to five days after they were applied so that the surgeon could inspect the wound. When patients had fevers of 101° F., casts were opened and the wound drained.

Experience during World War II varied in regard to primary suture. Only a limited number of cases were suitable for closure by this method. *Débridement* was found necessary in most wounded patients, and closed plaster of Paris casts were not generally employed. Changes in the types of wounds were accountable for the difference in treatment compared to older methods. During the American Civil War (1861–65) about 90% of wounds were caused by bullets, during World War I about 35%, and during World War II only 20%; 80% were caused by high explosives, fragments, mines, artillery or mortar shells. Modern high explosive shells or fragments inflicted a great amount of cellular and molecular damage to tissues. The impact of the projectile often sent waves that imparted damage to distant regions or organs. It took four to five days before the tissues regained their vitality from the shock or blast of the projectile. For this reason, many wounds were left open for nearly a week after *débridement*. After that, and provided the wounds were clean, they were closed by suture and healed promptly. Some small wounds were carefully trimmed, closed by primary suture and healed promptly without infection.

Burns were of grave concern to the military surgeon, since warfare had been mechanized and fighting took place

near gasoline, fuel oil and kerosene. Naval vessels, aeroplanes and tanks carried stores of high octane gasoline, fuel oil and other inflammable material. The U.S. navy found that sailors were less severely burned when they wore clothing than when stripped to the waist. Specially impregnated clothing which resisted fire was developed, and fire fighting and rescue squads were issued asbestos clothing. A flash cream was used that would protect against the ill effects of temperatures of 3,000° F. for very short periods. The cream was applied to the face, hands and exposed parts of the body before the man went into action. Actual burns were treated by giving enough blood plasma to prevent changes in the circulating plasma, by morphine to overcome shock and by application of a bland sterile ointment to cover the wound. Strong agents such as tannic acid, picric acid and potassium permanganate were discarded early in the war. Scrupulous attention to aseptic handling of burns was responsible for a reduction in the number of infected wounds. Some advocated sterile petrolatum; others cod liver oil ointment. However, the real success in the treatment of burns followed meticulous sterile technique in dressing burns rather than being dependent on the type of ointment employed. Patients with severe burns or burns of the face and hands were treated in forward hospitals until they could be evacuated to rear zones. Plastic surgery centres were established where ugly scars were removed and facial appearances restored. The slow and painstaking efforts of the plastic surgeons in many of the centres produced almost miraculous results for the badly burned soldier or sailor.

Injuries to nerves were encountered quite frequently during the war. The extensive use of land mines by the Germans led to many serious wounds of the arms and legs with nerve damage. Surgeons attempted early nerve suture in clean wounds with some success. Infected wounds had to be débrided, treated with penicillin or sulfa drugs by mouth before the damaged nerve ends could be sutured. Very fine tantalum wire and "nerve glue" (plasma acacia) were found to be helpful agents in joining severed nerve ends together. At times nerve grafts (a section of nerve tissue from elsewhere in the body) were employed in an attempt to overcome the disability.

Reconditioning Program.—A reconditioning program of calisthenics was instituted by the U.S. army to accelerate the return of wounded soldiers to duty. Group participation was possible by having trained physical instructors give exercises to patients in wards. Every effort was made to keep the man in the best possible physical condition in order to reduce the amount of training needed after he left the hospital. Educational and emotional reconditioning followed closely the physical reconditioning. Convalescence was reduced in many instances under this reconditioning program in contrast to the older method of having the patient idle in bed until he was ready for discharge. All training was prescribed by the ward medical officer, who supervised the amount and kind of training. Patients with a fever or some aggravation of their illness were promptly taken from the reconditioning program and treated by rest and other appropriate measures until they were able to resume the training.

When soldiers had made sufficient progress, they were moved from the hospital wards to barracks on the hospital grounds. Their hospital clothes were taken from them and they were given their military uniforms. They were called trainees—not hospital patients—as a further indication of

the new viewpoint. A graduated system of calisthenics, drills, games and military training followed. Convalescence was remarkably shortened—in some instances cut in half—and valuable, well-trained men were quickly restored to military duty or civilian occupations.

Rehabilitation of the deaf and blind necessitated special care. The deafened were sent to hospitals designated as special centers. A convalescent camp at Old Farms, Conn., was used to teach the blind how to walk down streets, climb stairs, get in and out of vehicles and other phases of normal living.

Collection and Evacuation of Casualties.—An efficient system of the collection and evacuation of casualties in amphibious operations was a noteworthy advance of military medicine during World War II. Large-scale landing operations in Europe, Italy, southern France, New Guinea, the Philippines, Okinawa and other Pacific islands helped develop an efficient practical method of evacuation. Assault troops had attached medical personnel to give initial treatment to the wounded and prepare them for evacuation. Field medical personnel followed the assault units during the landings and set up aid stations as near the front as circumstances would allow but in areas that afforded the maximum shelter and safety. Only limited amounts of medical supplies were taken, about as much as the medical department soldiers could easily carry. Later, as the beach was secured, amphibious vehicles made delivery directly to the shore supply depot.

Wounded were evacuated from aid stations to clearing or collecting units as rapidly as the situation would permit.

Extensive use of motor vehicles reduced the arduous task of carrying patients by litter to a minimum and accelerated the evacuation of the wounded to hospitals. Field motor ambulances proved their worth on all battle fronts. The newly designed "jeep" was quickly converted to a small ambulance by the addition of an adjustable frame that made it possible to carry two litter patients. Jeeps were driven as far forward as possible, often to within a short distance of the aid station, and loaded with litter cases or sitting wounded. Difficult terrain, such as the mud of New Guinea, Burma, France or the mountains of Algiers or Italy, did not stop the ambulance "jeep."

Medical officers at clearing stations examined the wounded and sorted the seriously wounded from the slightly wounded (this process of sorting was called triage). Prompt attention was given to the seriously wounded by trained shock units or surgical units. Seriously wounded patients who could be transported were sent as soon as possible to special hospitals, either surgical or field hospitals. Often a platoon or two of an auxiliary surgical group was assigned to a field or surgical hospital to give expert surgical care to the nontransportable seriously wounded. Many lives and limbs were saved by this system. Serious abdominal, chest and head wounds were expertly operated on near the front lines. Triage and early collection of casualties were also responsible for much of the success of the plan. Great credit was due the battalion aid man, who often braved withering fire to bring a wounded soldier back to the aid station.

Large-scale evacuation of wounded by air was another real advance in the treatment of the sick and wounded during World War II. Wounded were sent from clearing stations to designated air fields, where they were flown to general hospitals. During the early phases of the landings in Normandy, seriously wounded were flown from France to England for definitive care. It was estimated that 10% to 15% of all the sick and wounded in the European

theatre of operations were returned to the United States via military planes.

Hospital trains were used for the transportation of the wounded by rail.

The U.S. navy used a similar method of evacuation with few modifications. Wounded were evacuated to aid stations where bleeding was arrested, wounds were dressed and burns and shock were treated by administration of plasma. Those able to be evacuated were taken to ships, and abdominal cases, open chest wounds and head injuries had early priority. No wounded still in shock were evacuated beyond that aid station. Amphibious vehicles and L.S.T.s were found the most satisfactory means of evacuating wounded.

In an amphibious operation certain vessels, transports, destroyers and L.S.T.s were designated to receive casualties and remained offshore while the remainder of the invasion force returned to its base. Ships standing offshore received wounded by various methods. Wounded were classified as soon as they were brought on deck. Seriously wounded were treated for shock at once. As soon as they were out of shock they were taken to the operating room, where the necessary surgery was performed. Proper treatment of shock with plasma, heat and morphine allowed many to have early surgery done. The surgeon was given greater freedom of action by the careful selection of anaesthetics. The proper use of inhalation anaesthetics, oxygen and carbon dioxide mixtures did much to reduce mortality from severe chest, head and abdominal wounds. Intravenous anaesthetics such as pentothal sodium were found invaluable for operations requiring a short time, and such anaesthesia was used in more than half of all cases on several ships. Special cases required spinal and local anaesthesia. Less severely wounded were sent to dressing, ambulatory, medical or observation wards for appropriate treatment. As soon as a complement of sick and wounded had been gathered, hospital ships or transports left the combat zone for a base where definitive care and reparative surgery could be given. In conformity with the Geneva and Hague conventions, hospital ships were painted white, marked with red crosses and a green stripe, and were fully lighted between sundown and sunrise.

Combat Fatigue.—Psychiatric conditions constituted a large proportion of cases medical officers had to treat. Anxiety neurosis, conversion hysteria and other mild neuroses were treated by psychotherapy, rest, group psychotherapy, occupational therapy, narcosynthesis, analysis and other accepted methods of treatment.

Combat fatigue was most successfully treated in forward areas. The farther to the rear that these patients were evacuated, the less was the likelihood of their return to duty. Specific treatment for physical fatigue combined with individual treatment of anxiety symptoms gave excellent results in forward hospitals. Group psychotherapy was most helpful when enthusiastic and understanding medical, nursing and hospital staffs were able to make the patients feel a part of the treatment group. Skill and experience were needed to achieve these aims. The new group became to the men a substitute for their old combat organizations, and the patients were helped to regain some of the stability they had lost during combat. Within a few weeks, association with the hospital group permitted many men to regain their equilibrium so that one-half of the men voluntarily asked to be transferred to their former combat units. (See also NURSING, WAR; PSYCHIATRY; REHABILITATION OF THE DISABLED.)

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Milk

The production of milk increased steadily in the United States during the decade 1937-46 and reached a new high record in 1945. The nation was fortunate in that the cycle of cow numbers, which had reached a peak in 1934 and declined until 1938, was beginning to increase when World War II began. The number of milk cows increased from 22,575,000 head in 1925 to 26,931,000 head in 1934 and then dropped to 24,834,000 head in 1938. By 1945 the number had increased to 27,674,000 head; there were 26,785,000 head on Jan. 1, 1946.

Milk production during this period increased steadily, although the production per cow dropped off after 1942 because of a smaller number of cows being milked—a reflection of the acute labour shortage on farms. The total milk production reached a record high point of 123,000,000,000 lb. in 1945. In the campaign for greater food production the government estimated the U.S. need at 140,000,000,000 lb. for 1943 but, realizing that such an increase was impossible, set the goal at 122,000,000,000 lb.; actual output was 120,966,000,000 lb. The less favourable price of milk compared with the cost of feed and the growing labour shortage combined to hold down production. Dairymen complained of government controls and shipping difficulties and the lack of machinery. Widespread disturbances were a factor in unsettling the milk producing industry in 1937 and 1938. Local milk control boards were set up to foster price agreements between producers and distributors. The federal government presented cases against producers, distributors and wagon drivers in the Chicago area, thereby creating widespread unrest. With the outbreak of World War II in 1939, canned milk became important and the milk drying industry began to expand rapidly. The striking changes in the milk industry were the increase in production of evaporated milk and the decline of butter for civilian consumption. Higher consumer purchasing power led to the use of more whole milk, which reached a high record of 410 lb. per capita in 1944. At the same time the production of butter dropped to 12 lb. per capita, the lowest in 20 years, and civilian consumption was the lowest in half a century because of the large amounts taken by the government for the military forces. A large part of the cheese production was also reserved for the military forces, and civilian consumption declined.

When the United States entered World War II, the use of dried milk in place of evaporated milk was adopted because the former required less cargo space in ships. When lend-lease shipments began, evaporated milk was called for and since butter was not in demand for lend-



French Red Cross nurse pouring milk for a baby in the slum section of Marseilles. American Red Cross donations of milk reached Free France in 1941 before U.S. entry into the war

lease, manufacturers were urged to convert to produce evaporated milk. The production of evaporated milk increased from about 4,065,000,000 lb. in 1937 to 7,450,000,000 lb. in 1944. Dried whole milk increased during the same time from 103,000,000 lb. to 1,465,000,000 lb.

Civilian consumption of fluid milk increased steadily during the decade from an average of 340 lb. per capita in 1935-39 to about 450 lb. in 1946. While in 1946 retail milk prices were raised quite generally, these prices had remained quite stable through the period 1937-44 at around 13 cents per qt. for milk sold retail by producers, and 15 to 17 cents per qt. in cities.

Price supports on manufactured dairy products were begun in April 1941, when minimum prices for butter, evaporated and dried milk and cheese were established. The price of butter was then fixed at 31 cents per lb. at Chicago. In March 1942 this price was increased to 36 cents, in July to 39 cents and in November to 46 cents. The prices of cheese and dry milk were set in the equivalent to butter. These price support programs were discontinued on Dec. 31, 1944.

Subsidies were used after 1942 to get high milk production without increasing prices to consumers. These were in three forms: production payments direct to producers; payments to processors of cheese and butter; and the purchase and resale of fluid milk in 13 metropolitan centres. During 1943 these three subsidies amounted to about 4% of the farmer's cash income for dairy products, 15% in 1944 and 16% in 1945. The total amounts so expended were \$126,900,000 in 1943; \$501,700,000 in 1944; \$602,200,000 in 1945; and an estimated \$500,000,000 in 1946.

Dairy feed payments were begun in Oct. 1943 following

the fixing of price ceilings on dairy products in late 1942. Feed costs rose sharply through 1943, making milk production unprofitable, and it declined. A processor's subsidy of $3\frac{3}{4}$ cents per lb. was begun in Dec. 1942 and continued until Feb. 1946. A butter subsidy began in June 1943 and continued until Nov. 1945. The fluid milk subsidies started in April 1943 and were replaced by a purchase and resale program under which the government purchased the milk from the handlers at a higher price and sold it back to the dealers at the old price so as to absorb the difference in price.

The dairyman's price for milk rose from an average of \$1.49 per 100 lb. for 1935-39 to \$2.02 in 1941; \$2.38 in 1942; \$2.50 in 1945; \$4.30 in Dec. 1946. In relation to feed costs, prices received by farmers for dairy products were above the prewar relationship after the beginning of World War II. Until 1943, however, prices of other farm products increased more rapidly than dairy products, leading the government to institute production payments to stimulate dairy production in 1944 and 1945. Prices of feed advanced sharply in 1943. Although returns to dairy-men compared favourably with returns to producers of other livestock, the number of cows kept for milk began to decline in 1945. The supply of labour and higher farm wage rates apparently had more than the usual effect on dairymen's actions. The heavy purchase of grains for export for relief purposes in 1945 and 1946 created a strong competition for dairy feeds, particularly in the feed-deficit areas.

The high price of dairy cows was another factor checking production. Milk cows averaged \$54.00 per head during 1935-39 and rose steadily to about \$125.00 per head in early 1946, a 37-year record. This reflected the higher prices of meat in general and the better quality of the cows sold. The total value of sales of dairy products reached a record total of \$3,600,000,000 in 1945, including about \$500,000,000 in direct production payments.

Exports of dairy products increased greatly during World War II as they did in World War I, although during the period between the wars exports and imports were in close balance. The peak of exports came in 1919 and again in 1944 but differed in the kinds of products exported. In 1919, exports amounted to 34,536,000 lb. of butter, 14,160,000 lb. of cheese, 852,865,000 lb. of evaporated and condensed milk, while in 1944 87,500,000 lb. of butter, 274,245,000 lb. of cheese and 592,635,000 lb. of evaporated and condensed milk were exported, in addition to 32,683,000 lb. of dry whole milk and 206,688,000 lb. of nonfat dry milk. The latter products represent a much larger quantity of whole milk than butter, cheese or condensed milk. The total exports for World War II represented nearly 5% of total U.S. production. Large quantities of dairy products for export were transferred from the armed forces late in 1945 and early 1946. However, orders were issued that processors should set aside 40% of their cheese and 60% of nonfat dry milk for government purchase in May and June 1946.

World milk production was maintained to a remarkable degree through the decade 1937-46. Compared with prewar levels, milk consumption was high in the United States, Canada and the United Kingdom. Milk production in Europe, which in prewar years amounted to about one-half of world production, had dropped 25% by 1944 and made further losses in 1945 and 1946. The U.S. department of agriculture estimated that 1946 production in Europe was only 65% of prewar production. With better feed supplies, the output of milk showed increases in Canada, Denmark, Switzerland and Argentina in the first

half of 1946. No estimates were available for the soviet union, but considering the large losses of livestock during the war the national total was probably much below the 63,000,000,000 lb. reported by soviet officials for 1938. (See also BUTTER; CHEESE; DAIRYING.) (J. C. Ms.)

Production of Milk in United States, 1937-46
(in pounds)

1937	105,958,000,000	1942	122,066,000,000
1938	108,633,000,000	1943	120,966,000,000
1939	109,618,000,000	1944	121,714,000,000
1940	112,336,000,000	1945	123,250,000,000
1941	118,324,000,000	1946 est.	119,500,000,000

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Miller-Tydings Act

See ADVERTISING.

Millis, Harry Alvin

Millis (1873—), U.S. economist and labour arbitrator, was born at Paoli, Ind., on May 14, 1873. After receiving his bachelor's and master's degrees at Indiana university and his doctorate at the University of Chicago, he was appointed professor of economics and sociology at the University of Arkansas in 1902. The following year he joined the faculty of Stanford university, and from 1912-16 he was chairman of the department of economics at the University of Kansas. In 1916 he went to the University of Chicago as professor of economics. As chairman of the board of arbitration for the men's clothing industry in Chicago in 1919, he first became associated with the problems of labour disputes. He became widely known for his tact and perseverance in effecting conciliations between employer and labourer. In 1934-35 he was a member of the National Labor Relations board, and Pres. Roosevelt again appointed him to the board in Nov. 1940, when he succeeded J. Warren Madden as chairman. Millis was also permanent conciliator between the United Automobile Workers' union and General Motors corporation. He remained chairman of the NLRB until June 1945, when he was succeeded by P. M. Herzog.

Millstones

See ABRASIVES.

Mindszenty, Joseph

Cardinal Mindszenty (1892—), cardinal archbishop of Esztergom, Hungary, and primate of Hungary, was born at Csehimindszenty, Hungary. He was ordained in 1915. Named bishop of Veszprima in March 1944, he was elevated to the archbishopric of Strigonia in Oct. 1944 to succeed Justinian Cardinal Seredi. He consistently refused to submit to nazi threats, and was arrested and remanded to jail for four months in 1944 for defying the nazi-sponsored Premier Frederic Szalasi. On Sept. 24, 1945, he was appointed archbishop of Esztergom and primate of Hungary. He was created a cardinal by Pope Pius XII on Feb. 18, 1946.

Mineral and Metal Production and Prices

In the mineral industries of the world, the decade 1937-46 was a memorable one, for reasons other than war alone. In 1929, world mineral production had reached a record level, only to be followed by the lean years of the depression which brought the over-all production level down to where it had stood in 1917. Although the United States lagged somewhat behind the rest of the world in recovery from the effects of the depression, the 1936 world

mineral activity almost equalled the former record year of 1929, and 1937 passed it by a considerable margin. The recession of 1938 still left world output higher than in 1929, and 1939 slightly exceeded the 1937 level.

Under the demand for minerals created by World War II, production of almost every important mineral commodity was increased, while those most essential to the war program were expanded many fold. Not only were old, established industries enlarged, but new ones, all of which required mineral products, were created. Even the old, familiar standbys like iron, copper, lead and zinc were required in such quantities that three years or more of strenuous production effort were consumed in bringing production up to where it could meet the essential war demand, with only meagre rations left for ordinary civilian needs.

The production record of the war years still contained many gaps at the end of 1946, some of which would probably never be filled. Information withheld by censorship for security reasons had been largely released, though delays were caused by lack of help. In some countries in the active war zones, conditions became so disorganized that it became difficult, if not impossible, to collect and compile production data, and probably in some cases data already collected was destroyed.

Almost immediately after the cessation of hostilities, representatives of various U.S. government agencies were sent to the axis and occupied countries to collect information along technical and statistical lines, and it was through their efforts that much of the desired information was secured promptly.

The statistical data still lacking were chiefly from the smaller European countries in the active war zone, and a few others, where the difficulty seemed to be a matter of delay in compiling and reporting. Inspection of the various world production tables accompanying most of the reviews of the mineral commodities showed relatively few figures missing from major producers, except in the cases of the U.S.S.R. and Japan, both of which followed a policy of restricting information of this kind. While the results were less complete for the minor producers, these nations usually contributed such a small proportion of the total that a fairly good idea could be had of the world picture, in spite of these gaps.

To show the trend of world production, both with respect to countries and commodities, there are presented a series of tables covering the major producers and their most important contributions to the world mineral production in 1937, 1941 and 1945. (See Tables I to III). These tables were compiled mainly from the publications of the U.S. bureau of mines, but in numerous places gaps were filled from other sources; many of the figures on metal content of ores were obtained from the *Yearbook* of the American Bureau of Metal Statistics, and most of the steel figures are from *Iron Age* (Chilton Company, Inc., New York). For the most part, these tables conform to the tables of world production accompanying the reviews of the individual commodities, but at times differences will be found.

Prices.—To supplement the preceding information of production, it is also interesting to have correlative information on prices; Table IV presents the year-end prices for a selected group of the more important minerals and metals, as quoted on the New York market for each year from 1937 to 1946, while Table V covers the same group of commodities as quoted on the London market.

During the years of World War II, prices for most of

Table 1.—World Mineral and Metal Production in 1937
(Metric tons unless otherwise specified; Th. indicates thousands and Mi. millions of units.)

Country	Aluminum (Th.)	Bauxite (Th.)	*Antimony (Th.)	Asbestos (Th.)	Cadmium (Th. Lb.)	Chromite (Th.)	Coal (Mi.)	Coke (Mi.)	Copper, in Ore (Th.)	Copper (Smelter) (Th.)	Diamonds (Th. carats)	Gold (Th. Oz.)	Iron Ore (Mi.)	Pig Iron (Mi.)	Steel (Mi.)	Lead, in Ore (Th.)	Lead (Smelter) (Th.)
Algeria	—	—	0.8	—	—	—	p	—	—	—	626.4	—	2.43	—	—	4.1	—
Angola	—	—	—	—	—	—	—	—	—	—	—	1,381	1.89	0.93	0.81	250.0	232.2
Australia	—	7.9	0.4	0.2	210.6	0.5	15.7	1.0	19.4	17.7	4,925.2	420	—	—	—	4.9	—
Belgian Congo	—	—	—	—	—	—	—	—	p	150.6	—	—	0.27	3.84	3.87	—	93.3
Belgium	—	—	—	—	271	—	29.9	6.1	—	90.3	—	—	—	—	—	—	—
Bolivia	—	—	6.6	p	—	—	—	—	3.7	—	—	14	—	—	—	18.2	—
Brazil	—	8.8	—	—	—	3.0	0.8	—	—	—	238.6	146	0.21	0.10	—	—	—
Burma	—	—	p	—	—	—	—	—	3.8	—	—	1	0.03	—	—	78.9	77.7
Canada	41.7	—	p	372.0	338.0	3.9	14.4	2.0	240.4	210.0	—	4,096	1.49	1.00	1.37	186.9	181.2
Chile	—	—	—	—	—	—	2.0	—	413.3	396.4	—	273	—	—	—	0.6	—
China	—	—	14.7	p	—	—	p	p	p	p	—	—	—	—	0.06	2	1.5
Colombia	—	—	—	—	—	—	0.3	—	—	—	—	442	—	—	—	—	—
Czechoslovakia	—	0.8	1.0	—	—	—	34.7	3.3	—	2.0	—	10	1.84	1.68	2.32	3.8	4.3
France	34.5	688.2	—	0.3	99	—	45.3	7.9	0.6	1.0	—	66	37.84	7.92	7.92	4.6	37.2
Germany	127.2	18.2	0.2	—	355	—	368.1	40.9	27.1	68	—	8	9.58	15.96	19.85	75	162.4
Gold Coast	—	—	—	—	—	—	—	—	—	—	1,577.7	559	—	—	—	—	—
Greece	—	137.4	—	p	—	52.6	0.1	—	0.3	—	—	—	0.30	—	—	4.6	5.9
Guiana, Brit.	—	305.5	—	—	—	—	—	—	—	—	36.0	36	—	—	—	—	—
Guiana, Neth.	—	393.4	—	—	—	—	—	—	—	—	—	13	—	—	—	—	—
Hungary	1	532.7	—	—	—	—	9.0	p	0.3	—	—	5	0.29	0.36	0.71	—	0.1
India	—	15.9	—	0.1	—	63.3	26.1	1.9	7.2	6.9	—	331	2.88	1.66	0.97	—	—
Indo-China	—	7	p	p	—	—	2.3	p	—	—	—	10	0.03	—	—	—	p
Italy	22.9	386.5	0.4	6.4	90.9	—	2.0	1.7	1.1	1.5	—	3	1.00	0.87	2.09	35.2	38.9
Japanese Emp.	10	—	—	1	30	40	p	—	p	92.7	—	1,581	—	2.80	5.81	16	16.1
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—	7.77	2.51	2.51	—	—
Malaya	—	19.3	—	—	—	—	0.6	—	—	—	—	34	1.69	—	—	—	—
Manchuria	—	—	—	—	—	—	—	—	—	—	—	119	—	0.65	—	—	—
Mexico	—	—	9.8	—	619.8	—	0.9	(.05)	46.1	45.8	—	846	0.14	0.09	—	218.1	214.7
Morocco, Fr.	—	—	p	—	—	—	0.1	—	—	—	—	5	0.07	—	—	16	—
Neth. Indies	—	199.0	—	—	—	—	1.4	—	p	—	—	56	—	—	—	—	—
New Caledonia	—	—	—	—	—	48.0	—	—	—	—	—	1	—	—	—	0.4	0.2
Norway	23	—	—	—	154.2	0.2	—	—	20.1	8.3	—	—	1.01	0.18	—	42.0	19.1
Peru	—	—	1.3	—	—	0.1	p	p	35.7	35.4	—	205	—	—	—	—	—
Philippines	—	—	—	—	69.9	—	p	2.0	—	—	—	717	0.60	—	—	—	—
Poland	—	—	—	—	124.5	—	36.2	2.1	—	—	—	—	0.78	0.72	1.45	6.2	17.6
Portugal	—	—	p	—	—	—	0.3	—	5.6	—	—	4	p	—	—	1.3	—
Rhodesia, No.	—	—	—	—	—	—	—	—	249.8	211.5	—	4	p	—	—	4.0	0.6
Rhodesia, So.	—	—	p	51.7	—	275.6	1.0	p	—	—	—	804	—	—	—	p	—
Sierra Leone	—	—	—	—	—	0.7	—	—	—	—	913.4	36	0.64	—	—	—	—
South Africa	—	—	—	26.0	—	168.6	15.5	0.1	11.4	13.3	1030.4	11,735	0.46	0.28	0.33	p	—
So. West Africa	—	—	—	—	132.8	—	—	—	1.6	—	196.8	3	1.01	—	—	9.7	1.4
Spain	p	—	p	—	—	—	2.3	(0.7)	28	10.2	—	3	1.27	0.14	0.17	27	32.0
Sweden	1.8	—	—	—	—	—	0.5	0.1	7.2	9.1	—	193	14.95	0.69	1.11	9.3	—
Thailand (Siam)	—	—	—	—	—	—	—	—	—	—	—	14	—	—	—	—	—
Tunisia	—	—	—	—	—	—	—	—	—	—	—	—	0.94	—	—	12.6	24.8
Turkey	—	—	0.5	0.2	—	192.5	2.4	0.1	p	0.4	—	p	14.44	8.63	13.17	28.8	10.3
United Kingdom	19.3	—	—	—	124.1	0.3	244.3	15.2	7.5	—	—	7	73.25	37.75	51.38	421.8	423.2
United States	132.8	431.9	1.1	11.0	2,125	2.4	451.2	47.5	763.8	820.3	—	4,112	26	14.52	17.83	55	55
U.S.S.R.	37.7	230	—	125	50	200	127.1	20	p	94.3	—	5,359	—	—	—	—	—
Venezuela	—	—	—	—	—	—	—	—	—	—	—	117	—	—	—	—	—
Yugoslavia	0.2	354.2	1.4	p	—	59.9	5.0	—	42.3	39.4	—	88	0.63	0.04	—	71	4.0
World Total	481.5	3,746	38.6	?	3,972	1,280	1,550	153	2,336	2,345	9,614	35,624	212	104	136	?	1,681

Country	Magnesium Crude (Th.)	Manganese Ore (Th.)	Mercury (Th. Flasks)*	Nickel (Th.)	Petroleum (Mi. Bbl.)	Phosphate Rock (Th.)	Platinum Metals (Th. Oz.)	Potash (Th.)†	Pyrite (Th.)	Salt (Mi.)	Silver (Mi. Oz.)	Sulphur (Th.)‡	Tin, in Ore (Th.)§	Tin (Smelter) (Th.)	Tungsten Conc. || (Th.)	Zinc, in Ore (Th.)	Zinc (Smelter) (Th.)
Algeria	—	—	0.14	—	—	631.1	—	—	38.8	0.06	0.07	—	—	—	—	8.3	—
Angola	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Australia	20.1	1.2	p	—	p	0.6	p	41.3	0.08	14.29	—	—	3.3	2.9	0.9	206.7	70.9
Belgian Congo	—	27.5	—	—	—	—	—	—	p	2.96	—	—	8.1	2.3	—	3.1	—
Belgium	—	—	—	—	—	—	—	—	—	—	—	—	—	5.5	—	3	225.6
Bolivia	—	—	0.02	—	0.1	—	—	—	—	—	9.45	1.7	25.1	—	1.8	11.5	—
Brazil	—	262.4	—	0.1	—	—	—	—	—	0.77	0.03	—	—	—	p	—	—
Burma	—	—	—	1.2	7.8	—	—	—	—	0.05	6.18	—	7.5	—	6.9	59.5	—
Canada	—	p	—	102.0	2.9	p	259.2	—	108.4	0.42	22.98	—	—	—	—	186.2	143.8
Chile	—	13.0	—	—	—	p	—	—	p	0.04	1.85	16.8	—	—	p	—	—
China	—	51.4	1.74	—	—	8	—	—	—	3	0.15	—	12.9	11.1	17.9	4	—
Colombia	—	—	—	—	20.6	—	29.3	—	—	0.19	0.17	—	—	—	—	—	—
Czechoslovakia	92.1	—	2.75	—	0.1	—	—	—	18.4	0.17	1.10	—	—	—	—	1.9	7.3
France	—	—	—	—	0.5	103.6	—	489.8	145.8	2.34	0.56	0.2	—	—	—	0.9	60.4
Germany	21.1	0.2	1.78	0.9	3.2	3.3	—	1,968.4	447.3	3.37	6.77	—	0.1	2.7	—	165.5	163.8
Gold Coast	—	535.5	—	—	—	—	—	—	—	—	1.02	—	—	—	—	—	—
Greece	161.7	6.9	—	1.0	—	—	—	—	206.7	0.10	0.38	p	—	—	—	9.9	—
Guiana, Brit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guiana, Neth.	—	—	—	—	—	—	—	—	—	—	0.05	—	—	—	—	—	—
Hungary	—	25.1	—	—	p	—	—	—	—	—	—	—	—	—	—	—	—
India	26.6	1,068.5	—	—	2.2	0.2	—	p	—	1.71	0.02	—	—	—	p	—	—
Indo-China	—	5.3	—	—	20.3	—	—	—	—	0.19	—	—	1.6	—	0.6	5.0	4.2
Italy	5.4	33.5	66.96	p	0.1	0.2	1.3	0.4	914.5	1.56	0.72	338.1	0.1	0.1	p	71	38.0
Japanese Emp.	—	70	0.58	—	2.5	100	p	—	—	0.87	12.6	138.3	2.2	1.9	—	20	45.5
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malaya	—	33.3	—	—	—	—	—	—	—	—	p	—	77.3	95.4	1.4	—	—
Manchuria	331	—	4.94	—	46.9	—	—	—	—	—	—	—	—	—	—	—	—
Mexico	—	p	—	—	—	—	—	—	—	0.08	84.68	(1.3)	0.4	p	p	154.5	36.6
Morocco, Fr.	—	76.5	—	0.1	—	1,501.8	—	—	—	0.01	0.24	—	p	—	—	5.0	—
Neth. Indies	—	11.1	—	—	56.7	26.2	—	—	—	0.08	0.50	12.5	39.1	13.8	p	—	—
New Caledonia	—	—	—	11.6	—	0.3	—	—	—	—	—	—	—	—	—	—	—
Norway	2.1	—	—	0.9	—	—	—	—	1,048.3	—	0.28	—	—	0.2	p	8.8	41.3
Peru	—	0.2	—	—	17.5	—	—	—	—	0.04	17.45	1.6	0.2	—	p	18.3	—
Philippines	—	25.5	—	—	—	—	—	—	—	0.05	1.72	—	—	—	p	—	—
Poland	—	—	—	—	3.7	—	—	99.9	82.3	0.60	0.06	—	—	—	—	69	107.2
Portugal	—	0.3	—	—	—	—	—	—	604.1	p	0.01	—	1.1	—	2.1	p	—
Rhodesia, No.	—	2.4	—	—	—	—	—	—	—	—	0.08	—	p	—	—	19.1	14.3
Rhodesia, So.	—	—	—	p	—	—	—	—	20.3	—	0.15						

Table II.—World Mineral and Metal Production in 1941
(Metric tons unless otherwise specified; Th. indicates thousands and Mi. millions of units.)

Country	Aluminum (Th.)	Bauxite (Th.)	Antimony (Th.)	Asbestos (Th.)	Cadmium (Th. Lb.)	Chromium (Th.)	Coal (Mi.)	Coke (Mi.)	Copper, in Ore (Th.)	Copper (Smelter) (Th.)	Diamonds (Th. carats)	Gold (Th. Oz.)	Iron Ore (Mi.)	Pig Iron (Mi.)	Steel (Mi.)	Lead in Ore (Th.)	Lead (Smelter) (Th.)
Algeria	—	—	0.5	—	—	—	p	—	p	—	787	—	0.32	—	—	—	—
Angola	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Australia	—	5.5	0.5	0.3	195.0	0.4	19.1	1.8	21.2	22.0	—	1,497	2.35	1.50	1.71	261.2	216.9
Belgian Congo	—	—	—	—	3.1	—	p	—	p	162.2	5,866	561	p	p	—	—	—
Belgium	—	—	—	—	p	—	26.6	4.4	—	15.8	—	—	0.13	1.42	1.67	2.3	8.9
Bolivia	—	—	13.7	0.2	—	—	—	—	7.3	—	—	8	—	—	—	—	—
Brazil	—	14.4	p	p	5.9	—	1.4	p	—	—	325	235	0.42	0.21	0.13	—	—
Burma	—	—	p	—	—	—	—	—	—	—	—	p	p	—	—	p	74.5
Canada	194.0	—	1.3	433.5	567.6	2.2	16.5	2.4	291.8	254.5	—	5,345	0.47	1.57	2.45	207.3	206.9
Chile	—	—	—	—	—	—	2.1	—	465.5	453.6	—	278	1.70	—	—	—	—
China	—	—	8.0	p	—	—	6	p	p	1.6	—	(478)	—	1.38	—	p	p
Colombia	—	—	—	—	—	—	0.4	—	—	—	—	856	—	—	—	p	p
Czechoslovakia	—	—	1.6	—	p	—	2.3	—	—	—	—	p	1.69	p	—	p	p
France	63.9	587.4	—	—	p	—	43.8	(5.3)	0.1	0.7	—	60	10.57	1.50	1.50	18.0	23.2
Germany	233.6	25	p	—	p	—	514.6	50.9	24	46.9	—	6	18.0	(21)	23.41	172.8	172.8
Gold Coast	—	14.9	—	—	—	—	—	—	—	—	1,000	885	—	—	—	p	p
Greece	—	—	—	p	—	(37)	0.2	—	—	—	—	—	p	—	—	p	p
Guiana, Brit.	—	1,061.0	—	—	—	—	—	—	—	—	26.4	36	—	—	—	—	—
Guiana, Neth.	—	1,198.9	—	—	—	—	—	—	—	—	—	13	—	—	—	—	—
Hungary	3.6	832.4	—	—	—	—	12.6	p	—	—	—	p	0.78	0.44	—	—	p
India	—	13.2	p	0.4	—	50.9	29.9	2.0	13	6.1	—	286	3.25	2.04	1.43	—	—
Indo-China	—	3.5	p	—	—	—	1.1	p	—	—	—	(8)	p	—	—	—	p
Italy	48.2	542.9	0.8	10.8	184.0	—	4.4	1.8	1.3	2.9	—	11	1.34	1.11	—	37.0	37.0
Japanese Emp.	65.5	—	—	1	p	p	p	—	(99)	(124)	—	p	p	(3)	6.83	—	31
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	p	6.95	(1)	—	—	—
Malaya	—	25	—	—	—	—	(0.8)	—	—	—	—	p	(1.87)	—	—	—	—
Manchuria	—	—	—	—	—	—	—	—	—	—	—	(100)	—	—	—	—	—
Mexico	—	—	10.2	—	906.6	p	0.9	—	48.7	40.9	—	800	0.11	0.10	1.0	158.5	151.2
Morocco, Fr.	—	—	0.2	—	—	—	0.1	—	0.1	—	—	1	p	—	—	—	—
Neth. Indies	—	171.8	—	—	—	—	0.8	—	p	—	—	(90)	—	—	—	—	—
New Caledonia	—	—	—	—	—	64.5	—	0.1	—	—	—	—	0.10	—	—	—	p
Norway	17.5	—	—	—	p	—	p	—	18.0	5.0	—	p	0.57	—	—	—	p
Peru	—	—	1.4	—	—	—	0.1	p	36.8	28.3	—	285	—	0.12	—	32.9	32.9
Philippines	—	—	—	—	—	300	p	—	10	—	—	1,144	0.85	—	—	—	—
Poland	—	—	—	—	p	—	p	—	—	—	—	—	p	p	0.22	p	25
Portugal	—	—	p	—	—	—	0.5	—	p	—	—	(10)	p	—	—	—	—
Rhodesia, No.	—	—	—	—	—	—	—	—	p	231.9	—	3	p	—	—	—	0.4
Rhodesia, So.	—	—	0.1	49.2	—	323.9	1.4	0.1	p	—	—	790	p	—	—	—	—
Sierra Leone	—	—	—	—	—	15.1	—	—	—	—	850	26	1.05	—	—	—	—
South Africa	—	—	0.4	25.7	—	141.9	18.3	p	(13.4)	18.6	158.4	14,408	0.81	0.36	0.34	—	p
So. West Africa	—	—	—	—	179.6	—	—	—	(1.5)	—	46.6	p	p	—	—	—	—
Spain	1.1	1.4	0.1	p	—	—	9.6	0.8	8.9	—	—	(15)	1.72	0.55	0.55	27.5	46.9
Sweden	2.5	—	—	—	—	—	0.6	(0.1)	p	13.5	—	191	10.53	0.75	1.16	—	—
Thailand (Siam)	—	—	—	—	—	—	—	—	—	—	—	(13)	—	—	—	—	—
Tunisia	—	—	—	—	—	—	0.1	—	—	—	—	—	p	—	—	—	15.7
Turkey	—	—	p	0.1	—	150.3	3.3	0.1	10.5	10.4	—	—	p	0.09	—	0.9	—
United Kingdom	23.4	13.1	—	—	p	(1.2)	209.7	14.8	p	(4.5)	—	—	19.12	7.51	12.31	7.9	8.1
United States	280.4	952.1	1.0	22.1	3,282.0	12.9	517.6	59.1	869.2	1,015.3	—	4,832	51.46	51.46	75.15	418.6	494.1
U.S.S.R.	50	250	—	p	p	p	160	(16.5)	p	(157)	—	—	22.74	13.1	15.06	—	(75)
Venezuela	—	—	—	—	—	—	—	—	p	—	—	99	—	—	—	—	—
Yugoslavia	2	231.4	(4.8)	—	—	(71.0)	7.3	—	p	(43.0)	—	(75)	0.52	0.05	—	p	(32.9)
World Total	1,009.9	5,911.5	43.7	?	?	1,835	?	?	?	?	9,210.5	40,160	233	—	156	?	1,690

Country	Magne- sinite, Crude (Th.)	Manga- nese Ore (Th.)	Mercury (Th. Flasks)*	Nickel (Th.)	Petro- leum (Mil. Bbl.)	Phos- phate Rock (Th.)	Plati- num Metals (Th. Oz.)	Potash (Th.)†	Pyrite (Th.)	Salt (Mil.)	Silver (Mil. Oz.)	Sulphur (Th.)‡	Tin, in Ore (Th.)§	Tin (Smelter) (Th.)	Tungsten Conc.¶ (Th.)	Zinc, in Ore (Th.)	Zinc (Smelter) (Th.)
Algeria	—	—	0.20	—	—	446.5	—	—	47.1	0.07	0.05	—	—	—	—	2.0	—
Angola	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Australia	28.1	13.8	0.04	p	p	8.6	0.2	p	40.1	0.2	15.41	—	3.5	3.6	1.1	199.8	78.9
Belgian Congo	—	30.5	—	—	—	—	—	—	—	p	3.47	—	16.2	11.8	0.1	14.5	—
Belgium	—	—	—	—	—	—	—	—	—	—	—	—	—	P	—	—	47.2
Bolivia	—	p	—	—	0.2	—	—	—	—	—	7.35	2.3	42.2	—	4.4	8.6	—
Brazil	—	437.4	—	p	p	P	—	—	—	0.55	0.02	—	—	—	p	—	—
Burma	—	—	—	—	7.8	—	—	—	—	p	5.94	—	(5.5)	—	p	28.1	—
Canada	—	—	7.06	128.0	10.1	2.3	221.8	—	275.2	0.51	21.75	—	p	p	p	232.5	193.8
Chile	—	35.8	1.31	—	—	29.1	—	(8.6)	—	0.06	1.24	28.7	—	—	p	—	—
China	—	p	6.53	—	0.1	P	—	p	—	1.15	p	—	8	10	(3.1)	—	—
Colombia	—	—	—	—	24.5	—	37.3	—	—	0.08	0.27	—	—	—	—	—	—
Czechoslovakia	—	—	(2.58)	—	0.2	—	—	—	22	p	0.81	—	—	—	—	—	P
France	—	—	—	—	0.4	—	—	—	720	p	0.34	0.6	—	—	—	—	25.9
Germany	28.7	p	0.90	0.7	6.3	P	—	2,171.4	1,196.5	4.33	5.69	—	0.3	3	—	229.7	317.6
Gold Coast	—	498.9	—	—	—	—	—	—	—	—	0.04	—	—	—	—	—	—
Greece	(127)	p	—	p	—	—	—	—	—	p	p	P	—	—	—	—	—
Guiana, Brit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guiana, Neth.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hungary	—	P	—	—	3.2	—	—	—	—	p	—	—	—	—	—	—	—
India	41.4	798.6	—	—	2.9	p	—	5.3	—	1.81	0.02	—	—	—	p	—	—
Indo-China	—	p	—	—	p	P	—	—	—	p	p	—	1.4	—	(0.4)	—	—
Italy	4.6	59.8	94.16	p	0.1	(1.0)	—	—	1,023.1	1.48	0.81	294.3	0.2	p	p	78.1	28.8
Japanese Emp.	—	P	0.66	—	2.7	—	p	—	—	—	P	P	P	(2.5)	p	—	61.1
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malaya	—	(11.7)	—	—	—	—	—	—	—	—	p	—	78	125	(0.5)	—	—
Manchuria	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mexico	—	1.0	23.14	—	42.2	—	—	—	—	p	78.36	P	0.2	0.2	0.2	144.5	38.7
Morocco, Fr.	—	50.7	—	—	—	511.5	—	—	—	0.03	p	p	p	p	p	—	—
Neth. Indies	—	(11.6)	—	(2.2)	—	(34.1)	p	—	—	(0.39)	(1.51)	P	51	23	—	—	—
New Caledonia	—	—	—	10.4	—	—	—	—	—	—	—	—	—	—	—	—	—
Norway	—	—	—	0.9	—	—	—	—	932.9	—	0.26	—	—	1.0	p	4.4	6.5
Peru	—	—	—	—	11.9	—	—	—	—	0.05	15.12	0.9	p	—	0.3	22.8	—
Philippines	—	50.6	—	—	—	—	—	—	—	—	1.26	—	—	—	—	—	—
Poland	—	—	—	—	3.3	—	—	P	—	P	p	—	—	—	—	P	(120)
Portugal	—	1.8	—	—	—	—	—	—	172.8	p	p	—	2.3	1.5	5.8	—	—
Rhodesia, No.	—	4.8	—	—	—	—	—	—	—	0.05	—	—	p	—	—	13.8	13.8
Rhodesia, So.	—	—	p	p	—	—	—	—	34.3	—	0.17	—	0.2	—	0.3	—	—
Sierra Leone	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Africa	13.1	445.9	0.20	p	—	85.7	p	—	28.6	p	1.48	—	0.5	0.1	0.1	—	—
So. West Africa	—	—	—	—	—	—	—	—	—	—	—	—	0.1	—	0.1	—	—
Spain	0.2	10.0	86.47	—	—	p	13.8	—	574.5	0.55	0.46	6.2	0.1	p	0.4	42.3	19.1
Sweden	—	13.9	—	—	—	P	—	—	226.9	—	0.76	—	—	—	0.3	33.1	—
Thailand (Siam)	—	—	—	—	—	—	—	—	—	—	—	—	16.3	p	(0.4)	—	—
Tunisia	—	p	0.09	—	—	1,076.1	—	—	—	0.11	0.06	—	—	—	—	—	—
Turkey	1.9	1.4	0.24	—	0.2	—	—	—	—	0.20	(0.58)	2.6	—	—	—	—	—
United Kingdom	—	—	—	—	—	—	—	—	4.7	0.06	—	—	1.5	40	0.1	—	68.7
United States	340.0	79.6	44.92	0.6	1,402.2	4,764.9	32.7	476.2	655.6	11.54	71.08	3,139.3	p	1.8	6.0	679.6	745.7
U.S.S.R.	—	2,393	P	P	238.2	2,000	100	—	—	—	—	—	—	—	—	—	(85)
Venezuela	—	—	—	—	228.4	—	—	—	—	0.04	P	—	—	—	—	P	(5.0)
Yugoslavia	—	4.7	—	—	—	—	—	—	—	p	P	—	—	—	—	—	—
World Total	?	5,261	275	162	2,223	?	483	?	?	?	261.6	3,700	240	225	?	?	?

Table III.—World Mineral and Metal Production in 1945
(Metric tons unless otherwise specified: Th. indicates thousands and Mi. millions of units.)

Country	Aluminum (Th.)	Bauxite (Th.)	Antimony (Th.)	Asbestos (Th.)	Cadmium (Th. Kg.)	Chromium (Th.)	Coal (Mi.)	Coke (Mi.)	Copper, in Ore (Th.)	Copper (Smelter) (Th.)	Diamonds (Th. carats)	Gold (Th. Oz.)	Iron Ore (Mi.)	Pig Iron (Mi.)	Steel (Mi.)	Lead, in Ore (Th.)	Lead (Smelter) (Th.)
Algeria	—	—	(0.1)	—	—	—	p	—	p	—	786	—	(0.79)	—	—	—	—
Angola	—	—	—	—	—	—	—	—	—	—	—	635	(2.22)	(1.33)	—	160.6	160.5
Australia	—	3.8	p	(0.8)	258.1	(1.4)	17.7	(1.5)	27.7	26.3	10,386	381	—	p	—	—	—
Belgian Congo	—	—	—	—	17	—	p	—	160.2	160.2	—	—	—	0.72	0.50	p	8.5
Belgium	—	—	—	—	p	—	15.7	(2.0)	—	(4.3)	—	—	—	—	—	—	—
Bolivia	—	—	5.1	0.1	—	—	—	—	6.1	—	—	29	—	—	—	—	—
Brazil	p	7.1	p	p	—	1.5	(1.9)	p	—	—	275	178	0.30	(0.29)	0.19	p	—
Burma	—	—	p	—	—	—	—	—	—	—	—	p	—	—	—	—	—
Canada	195.7	—	0.7	423.6	288.9	5.1	14.9	3.0	216.0	198.6	—	2,662	1.03	1.78	2.54	147.7	147.5
Chile	—	—	—	—	—	—	(2.3)	—	470.2	461.6	—	180	0.94	—	—	—	—
China	p	—	(0.6)	p	—	—	(5.5)	(0.3)	p	—	—	p	—	(0.04)	—	(0.6)	(0.6)
Colombia	—	—	—	—	—	—	(0.5)	—	—	—	—	507	p	—	—	p	p
Czechoslovakia	—	—	p	—	—	—	14.2	p	—	—	—	p	0.44	—	—	—	—
France	37.2	200	0.1	—	p	—	35.1	2.3	p	(0.1)	—	(16)	7.82	1.19	1.16	4.8	4.8
Germany	(236.1)	(25)	p	—	p	—	149	(53.4)	(25)	(30)	—	p	p	p	5	(150)	(150)
Gold Coast	—	120	—	—	—	—	—	—	—	—	500	475	—	—	—	—	—
Greece	—	(10)	p	p	—	p	—	—	—	—	—	p	—	—	—	p	p
Guiana, Brit.	—	667.8	—	—	—	p	—	—	—	—	—	17	—	—	—	—	—
Guiana, Neth.	—	684.0	—	—	—	—	—	—	—	—	—	6	—	—	—	—	—
Hungary	(11.5)	(900)	—	—	—	—	4	p	p	—	—	p	p	p	—	p	p
India	1.5	p	p	p	—	p	26.4	p	p	—	—	170	p	p	1.38	p	p
Indo-China	—	—	—	—	—	p	p	p	p	—	—	p	0.05	0.07	0.40	p	0.8
Italy	p	2.6	0.3	p	p	p	p	p	p	p	—	p	p	p	1.06	p	(34.9)
Japanese Emp.	(136.8)	—	—	p	p	p	p	p	p	p	—	p	p	0.32	—	—	—
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	p	p	—	—	—	—
Malaya	—	(55)	—	—	—	—	p	—	—	—	—	p	p	—	—	—	—
Manchuria	—	—	—	—	—	—	p	—	—	—	—	p	p	—	—	—	—
Mexico	—	—	8.1	—	1,052.8	p	(0.9)	p	61.7	53.3	—	449	0.18	0.21	0.19	204.0	205.3
Morocco Fr.	—	—	0.1	(0.5)	—	—	p	—	p	—	—	(3)	—	—	—	—	—
Neth. Indies	—	(275)	—	—	—	—	p	—	p	—	—	p	—	—	—	—	—
New Caledonia	—	—	—	—	—	40.8	p	p	—	—	—	p	—	—	—	p	p
Norway	(20.0)	—	—	—	p	—	—	—	(14.5)	(0.9)	—	p	(0.26)	(0.12)	—	p	—
Peru	—	—	0.7	—	1.3	—	0.2	p	28.8	25.5	—	180	—	—	—	39.8	40.0
Philippines	—	—	—	—	p	—	—	—	p	—	—	p	p	—	—	p	—
Poland	—	—	—	—	49.2	—	21.0	0.9	—	—	—	p	p	0.23	0.14	p	7
Portugal	—	—	p	—	—	(1.5)	0.6	—	p	—	—	p	p	—	—	p	(1.0)
Rhodesia, No.	—	—	p	—	—	—	1.7	0.1	p	195.6	—	p	—	—	—	p	—
Rhodesia, So.	—	—	p	51.1	185.3	—	—	—	p	—	—	563	—	—	—	—	—
Sierra Leone	—	—	—	—	(9.8)	—	—	—	p	—	800	p	(0.64)	—	—	p	p
South Africa	—	2	26	—	80	21.9	p	p	17.4	1,141	12,214	0.87	0.56	0.54	p	p	p
So. West Africa	—	—	—	—	p	—	—	—	p	156	—	p	p	—	—	p	p
Spain	(0.2)	3.5	p	—	—	—	11.9	(0.9)	p	5.0	—	p	1.16	0.48	0.54	27.1	27.1
Sweden	(2.5)	—	p	—	—	—	0.5	p	p	(16.2)	—	74	(7.25)	0.76	1.23	10.4	10.4
Thailand (Siam)	—	—	—	—	—	—	—	—	p	—	—	p	—	—	—	p	p
Tunisia	—	—	—	—	—	—	—	—	—	—	—	p	(0.09)	—	—	p	p
Turkey	—	—	—	(0.2)	p	70	4.4	(0.2)	p	9.8	—	—	0.13	(0.07)	—	0.9	—
United Kingdom	32.4	35	—	—	p	174.7	(14.3)	p	701.2	784.2	—	929	14	7.22	12.01	3.6	(4.0)
United States	450.4	997.1	1.6	11.1	3,802.7	12.7	572.4	701.2	701.2	784.2	—	929	89.79	49.86	72.67	354.6	402.3
U.S.S.R.	86.3	400	—	p	—	—	154	(9.9)	p	p	—	p	p	p	17.96	p	p
Venezuela	—	—	—	—	p	—	p	—	p	—	—	58	p	p	—	p	p
Yugoslavia	(1.0)	(150)	p	—	p	p	p	—	p	p	—	p	p	p	—	p	p
World Total	916	3,926	?	?	?	?	?	?	2,200	2,200	14,257	23,930	?	—	122	?	?

Country	Magnesium Crude (Th.)	Manganese Ore (Th.)	Mercury (Th. Flasks)*	Nickel (Th.)	Petroleum (Th. Bbl.)	Phosphate Rock (Th.)	Platinum Metals (Th. Oz.)	Potash (Th.)†	Pyrite (Th.)	Salt (Th.)	Silver (Th. Oz.)	Sulphur (Th.)‡	Tin, in Ore (Th.)§	Tin (Smelter) (Th.)	Tungsten Conc.¶ (Th.)	Zinc, in Ore (Th.)	Zinc (Smelter) (Th.)
Algeria	—	—	(0.09)	—	—	(220.3)	—	—	(32.9)	(0.05)	p	—	—	—	—	p	—
Angola	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	p	—
Australia	23.1	p	(0.01)	p	p	—	0.1	p	(53.8)	(0.02)	9.4	—	2.5	—	(0.67)	136.5	85.1
Belgian Congo	—	—	—	—	—	—	—	—	—	(0.02)	2.50	—	17.1	2.4	0.32	20	10.3
Belgium	—	—	—	—	—	—	—	—	—	—	—	—	—	0.5	—	—	—
Bolivia	—	p	p	—	0.4	—	—	—	—	—	6.68	0.6	42.5	—	3.85	21.0	—
Brazil	—	244.6	p	p	0.1	(5.2)	—	—	—	(0.45)	p	—	—	—	2.24	p	p
Burma	—	—	—	p	(3.8)	—	—	—	—	—	p	—	0.2	—	—	p	p
Canada	—	—	—	110.7	8.6	0.3	317.6	206.6	0.62	12.87	12.87	0.4	0.4	—	p	231.1	165.3
Chile	—	(725)	(1.18)	—	(50.8)	—	p	—	(0.05)	(1.10)	(30.4)	—	—	—	p	—	—
China	—	p	(2.99)	—	(0.5)	p	—	p	—	—	p	—	1.5	1.0	(8.99)	—	—
Colombia	—	—	—	—	22.8	p	35.1	—	p	p	0.17	—	—	—	—	p	p
Czechoslovakia	—	—	p	—	(0.2)	—	—	—	p	p	(0.62)	—	—	—	—	p	p
France	—	—	p	p	p	—	(500.7)	(171.9)	p	p	(0.10)	(1.1)	—	—	(0.06)	p	8.1
Germany	20	p	p	p	9.6	p	(1,925.5)	p	(3.72)	p	—	—	(1.0)	(4)	—	p	(290)
Gold Coast	—	(512.5)	—	—	—	—	—	—	—	—	(0.06)	—	—	—	—	—	—
Greece	—	p	—	p	—	—	—	—	—	p	p	—	—	—	—	—	—
Guiana, Brit.	—	—	—	—	—	—	—	—	—	—	p	—	—	—	—	—	—
Guiana, Neth.	—	—	—	—	—	—	—	—	—	—	p	—	—	—	—	—	—
Hungary	—	p	—	—	4.9	—	—	—	—	—	p	—	—	—	—	—	—
India	(42.6)	p	—	—	(2.5)	p	—	p	—	(1.96)	p	—	—	—	p	p	—
Indo-China	—	p	—	—	—	p	—	p	—	—	p	—	0.2	p	p	p	p
Italy	p	15.4	40	p	(0.1)	p	p	p	102.5	p	p	80	p	p	p	p	(60.6)
Japanese Emp.	—	p	p	—	(3)	—	—	—	—	—	p	—	—	—	p	p	—
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malaya	—	p	—	—	—	—	—	—	—	—	p	—	2	2.5	p	—	—
Manchuria	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mexico	—	37	16.44	—	43.5	—	—	—	—	p	61.10	(29.0)	0.2	0.2	0.13	222.9	48.9
Morocco Fr.	—	45	p	p	—	1,635.0	p	—	—	(0.03)	p	p	p	0.8	p	—	—
Neth. Indies	—	p	—	—	(40)	p	—	—	—	—	p	—	—	—	p	—	—
New Caledonia	—	—	—	4.3	—	—	—	—	—	—	—	—	—	—	—	p	(11.8)
Norway	—	—	0.6	—	—	—	—	(1,750.4)	—	—	0.17	—	p	p	p	p	—
Peru	—	—	0.21	13.7	—	—	—	—	0.06	16.08	0.6	0.1	—	0.32	—	43.1	—
Philippines	—	p	—	—	—	—	—	—	p	p	p	—	—	—	—	p	—
Poland	—	—	—	0.7	—	—	—	p	—	p	p	—	—	—	—	p	36.4
Portugal	—	8.1	—	—	—	—	—	—	171.0	p	p	—	0.6	0.2	—	—	—
Rhodesia, No.	—	p	—	—	—	—	—	—	—	—	p	—	p	—	—	15.5	15.5
Rhodesia, So.	—	p	p	—	—	—	—	—	(33.7)	p	0.10	—	0.1	—	0.29	—	—
Sierra Leone	—	—	—	—	—	—	—	—	—	p	p	—	—	—	—	—	—
South Africa	7.1	106	0.64	p	—	53.2	—	—	(36.2)	p	(1.21)	—	0.5	1.0	0.5	—	—
So. West Africa	—	—	—	—	p	—	—	—	—	0.01	—	—	—	—	—	—	—
Spain	6.7	23.8	40.09	—	19	—	—	11.5	406.7	(0.69)	0.50	(5.7)	0.5	0.6	0.22	30	17.3
Sweden	(24.3)	—	—	—	(150)	—	—	—	(317.5)	0.92	—	—	—	—	(0.48)	p	1.8
Thailand (Siam)																	

Table IV.—United States Mineral and Metal Prices, 1937 to 1946
As quoted by E&M.J. Metal and Mineral Markets at the Yearend

Commodity	Grade	Unit	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Aluminum	99% ingot	Pound	20.00	20.00	20.00	17.00	15.00	15.00	15.00	15.00	15.00	15.00
Antimony, ore	50-55 Sb	S.T. unit	2.00	1.225	1.55	1.20	2.05	2.15	2.15	2.15	2.15	3.70
Metal	99% domestic	"	13.75	11.75	14.00	14.00	14.00	16.048	15.839	15.839	15.839	29.525
Arsenic	Chinese	"	17.00	14.00	16.50	16.00	16.50	16.50	16.50	16.50	16.50	nom.
	White oxide	"	3.0	3.0	3.0	3.5	4.0	4.0	4.0	4.0	4.0	6.0
Beryllium-copper	4% Be alloy(*)	"	23.00	23.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.75
Bismuth	Ton lots	"	1.00	1.05	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.80
Cadmium	Commercial sticks	"	1.175	60.00	75.00	80.00	90.00	90	90	90	90	1.25
Chromium, ore	48% Cr ₂ O ₃ , 3Cr; 1 Fe	Long ton	22.50	22.50	27.00	33.00	46.00	43.50	43.50	43.50	43.50	38.50
Metal	98%, spot	"	85	85	85	89	89	89	89	89	89	89
Ferroalloy	4-6% C, 66-70 Cr(*)	"	10.5	10.5	10.5	11	13	13	13	13	13	17.1
	2% C, 67-72 Cr(*)	"	16.5	16.5	16.5	17.5	19.5	19.5	19.5	19.5	19.5	19.5
Cobalt	97-99% Co.	"	1.36	1.36	1.36	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Copper	Domestic	"	9.90	11.025	12.275	11.800	11.775	11.775	11.775	11.775	11.775	19.275
	Export	"	9.475	10.150	12.400	10.200	11.200	11.700	11.700	11.700	11.700	19.550
Gold	Sponge, powder	Ounce	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Iridium	Mesabi, nonbessemer.	Long ton	90.00	67.50	125.00	275.00	175.00	165.00	165.00	120.00	95.00	110.00
Iron, ore	Basic	"	5.10	5.10	5.10	4.45	4.45	4.45	4.45	4.45	4.45	5.05
Pig	80% Fe, Joplin, Mo.	Short ton	23.50	20.50	22.50	23.50	23.50	23.50	23.50	23.50	25.25	30.00
Lead, ore	80% Fe, Joplin, Mo.	Short ton	52.93	54.38	64.00	64.54	68.84	76.54	76.54	76.54	76.54	160.50
Metal	New York	Pound	4.75	4.85	5.50	5.50	5.85	6.50	6.50	6.50	6.50	12.55
Magnesium	99.5% ingots	"	30	30	27	27	27	22.5	20.5	20.5	20.5	20.5
	Sticks	"	35	35	34	34	34	29.5	27.5	27.5	27.5	27.5
Manganese, ore	48% Fe, Atlantic ports	L.T. Unit	45	30	45	51	63	76.8	78.8	85	85.0	70.5
Ferroalloy	78-82% Mn.	Long ton	102.50	92.50	100.00	120.00	120.00	135.00	135.00	135.00	135.00	135.00
Spiegel	19-21% Mn.	"	80.50	77.50	145.00	165.50	36.00	36.00	36.00	36.00	36.00	36.00
Mercury	(75 lb.)	Flask	42	45	45	45	45	197	181.5	142.50	109.00	90.00
Molybdenum, ore	90% MoS ₂ (†)	Pound	95	95	95	95	95	95	95	95	95	45
Ferroalloy	55-65% Mo(*)	"	35	35	35	35	35	35	35	35	35	35
Nickel	Cathodes	"	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
Palladium	24% P	Long ton	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Phosphorus, ferro-		Ounce	36.00	34.00	40.00	36.00	36.00	36.00	36.00	35.00	35.00	60.00
Platinum		"	122.50	122.50	122.50	125.00	125.00	125.00	125.00	125.00	125.00	125.00
Rhodium	99.5%	Pound	2.00	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Selenium	97+%, spot	"	16.5	14.75	14.25	14.25	14.25	14.75	14.75	14.75	14.75	14.75
Silicon	50% Si.	Long ton	69.50	69.50	69.50	74.50	74.50	74.50	(*)6.65	(*)6.65	(*)6.65	(*)17.45
Ferro-	75% Si.	"	128.00	128.00	126.00	135.00	135.00	135.00	(*)8.05	(*)8.05	(*)8.05	(*)9.25
Silver	Foreign, New York	Ounce	44.75	42.75	34.75	34.75	35.125	44.75	44.75	44.75	70.75	84.75
Tellurium		Pound	1.875	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Tin	Straits	"	41.125	46.60	49.50	50.10	52.00	52.00	52.00	52.00	52.00	70.00
Titanium, ferrocabon-		Short ton	142.50	142.50	142.50	142.50	142.50	142.50	142.50	142.50	142.50	142.50
Tungsten, ore	Domestic	S.T. unit	23.75	18.00	23.00	23.75	26.50	26.00	26.00	24.25	24.25	24.00
	Chinese	"	25.00	23.50	23.50	25.00	24.00	24.00	24.00	24.00	24.00	24.00
Ferroalloy	75-80% W(*)	Pound	2.00	1.65	2.05	1.95	1.95	1.90	1.90	1.90	1.90	1.90
Powder	99% W.	"	3.00	2.625	2.875	3.125	2.625	2.625	2.625	2.625	2.625	2.625
Vanadium, ore	Fire ref., high grade	"	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Ferroalloy	(*)	"	2.80	2.80	2.80	2.80	2.80	2.825	2.825	2.825	2.80	2.80
Zinc, ore	60% Fe, Joplin, Mo.	Short ton	32.00	33.00	39.00	48.00	55.28	55.28	55.28	55.28	55.28	60.00
Metal	St. Louis	Pound	5.00	4.50	5.75	7.25	8.25	8.25	8.25	8.25	8.25	10.50

(*)Per pound of base metal contained. (†)Per pound of MoS₂ contained. (‡)Per pound of V₂O₅ contained.

Table V.—British Mineral and Metal Prices, 1937 to 1946
as quoted by the Metal Bulletin at the Yearend

Commodity	Grade	Unit	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946(†)
Aluminum	98-99%	Long ton	100	94	110	110	110	110	110	110	85	72
Antimony, ore	50-55 Sb	L.T. unit	5	9 1/2	11	8	13	6	nom.	nom.	11	15
Metal	99% domestic	Long ton	65	57	87	85	120	120	120	120	105	125
Arsenic	Chinese	"	64	52	87	90	nom.	nom.	nom.	nom.	nom.	nom.
	99% oxide, foreign	"	10	10	30	30	33	44	60	60	31	39
Beryllium-copper	Strip	Pound	?	?	?	?	12	9	9	9	9	13
Bismuth	"	"	4	4	3	1.25	6	3	6	6	6	9
Cadmium	"	"	5	2 1/2	5	6	5 1/2	5	5	5	5	8
Chromium, ore	Rhodesian 1st grade	Long ton	110	91	120	12	12	11	11	11	11	10
Metal	98-99%	Pound	2	2	3	3 1/2	3	4	6 1/2	4	4	4
Ferroalloy	4-8% C	Long ton	24	24	38	45	45	45	59	59	46	43
	2% C(*)	Pound	8	6 1/2	8	6 1/2	1	6 1/2	1	6 1/2	1	1 1/2
Cobalt	Fire ref., high grade	Long ton	39	44	46	61	61	61	61	61	61	97
Copper	Electrolytic	Long ton	43	50	62	62	62	62	62	62	62	98
Gold	Official	Ounce	139	149	168	168	168	168	168	168	172	172
Iridium	50% N. African.	Long ton	17	11	30	30	32	32	36	30	25	32
Iron, ore	Basic	"	30	22	23	6	nom.	nom.	nom.	nom.	nom.	nom.
Pig	80% Fe, R/C	"	5	4	6	6	6	6	6	6	7	8
Lead, ore	Foreign, soft	"	15	15	16	25	25	25	25	25	30	55
Metal	Ingots	Pound	?	1 5/2	1 5/2	1	6	1	6	1	6	1
Magnesium	Sticks	"	1	1	1	1	1	1	1	1	1	1
	50-52% Mn.	L.T. unit	19	17	17	13	18	13	13	18	19	19
Ferroalloy	18-22% Mn.	Long ton	?	?	?	11	11	11	11	11	11	11
Mercury	(75 lb.)	Flask	13	15	4	48	47	69	69	69	69	22
Molybdenum	85% MoS ₂	L.T. unit	47	45	50	52	42	6	43	9	43	41
Ferroalloy	70-75% C free(*)	Pound	4	5	7	6	6	6	6	6	6	5
Nickel	Refined	Long ton	182	182	192	192	190	192	192	192	192	192
Palladium	20-25% P	Ounce	4	15	5	10	5	10	5	17	6	17
Phosphorus, ferro-		Long ton	17	11	16	26	15	15	15	15	15	22
Platinum		Ounce	3	9	9	10	8	15	8	15	3	18
Rhodium		"	28	26	33	34	34	34	33	33	30	35
Selenium		Pound	7	3	3	3	8	8	8	8	8	8
Silicon	98-99% Si	Long ton	?	?	?	23	23	23	23	23	23	23
Ferroalloy	45% Si.	"	11	5	18	36	36	36	43	43	39	29
Silver	Official, spot	Ounce	19 1/4	20 1/4	22 1/4	23 1/4	23 1/4	23 1/4	23 1/4	23 1/4	23 1/4	25 1/4
Tellurium		Pound	7	7	nom.	7	7	7	7	7	7	7
Tin	99+%	Long ton	181	216	247	17	256	15	nom.	275	300	380
Titanium, ferrocabon-		Pound	5	5	6 1/2	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4	8 3/4
Tungsten, ore	65% WO ₃	L.T. unit	77	59	50	50	50	77	77	100	75	65
Ferroalloy	80-85% W(*)	Pound	nom.	4	4	5	5	5	9	9	6	5
Powder	98-99% W	"	?	?	?	?	?	9 1/2	9 1/2	9 1/2	7 1/2	6 1/2
Vanadium, ore	10-12% V ₂ O ₅	L.T. unit	55	nom.	nom.	nom.	nom.	nom.	nom.	nom.	nom.	40
Ferroalloy	35-60% V(*)	Pound	12	14	14	15	15	15	15	15	15	15
Zinc, ore	52% Fe, R/C	Long ton	41	37	nom.	nom.	nom.	nom.	nom.	nom.	nom.	nom.
Metal	G.O.B. foreign.	"	14	10	13	15	25	25	25	25	31	55

(*)Per pound of base metal contained. (†)Dec. 1st.

these commodities were under official government control in both countries, and showed little change from year to year. Where changes did occur, they usually reflected conditions of considerable importance in connection with the commodity in question. Most of the control prices were still in effect at the end of 1945, but the 1946 quotations show clearly the effect of the removal of price controls. In the United States all controls were released, but British prices on aluminum, copper, lead and zinc were still under official control at the end of 1946.

Reconversion and Rehabilitation.—The mineral industry in different parts of the world at the end of the decade 1937–46 was largely divided into two groups, each faced with its own peculiar problems. One group included producers located in areas where active warfare had affected operations, or where progress had been retarded by axis occupation and the subsequent disorganization that followed liberation. The other group included those outside the active war zones, most of whom had been called on for expansion of output far beyond normal levels of operation. The second group was faced with the necessity of pruning overgrown production facilities back to a size comparable with postwar demands, without knowing exactly what those demands were going to be. During the war years, the bulk of the output was required for essential war uses, and a large volume of demand for products for normal civilian and industrial uses was built up; additional demand was to be expected from the reconstruction and rehabilitation of areas devastated by the war. In the United States, reconversion was hampered greatly by labour disputes, and even at the end of 1946 had not gotten into full stride.

However painful the headaches of reconversion were considered, they were mild as compared with those suffered by producers in the active war zones, where production capacity had been destroyed by one side or the other in the conflict, and sometimes by both in turn. Both rehabilitation and reconstruction were necessary, sometimes from the ground up, with materials, labour, transportation and food all in short supply. In some cases coal was lacking simply because men did not have enough food to give them strength to swing a pick—aside from the fact that they did not have the pick. At the same time, food was short for lack of fuel to process and transport it.

In practically all of the axis-occupied countries there was a period of almost complete disorganization following liberation, and production activity slowed down almost to the stopping point. After governments had been reorganized, much of this trouble was remedied, as evidenced by the steady increases in monthly production statistics. In a few cases output was built up to prewar levels, but in many cases there was still shortage of labour because of population displacements, the inefficiency of available labour, lack of proper food, tools and equipment, and disorganization of transportation. Full rehabilitation of the devastated areas was a long and painful task, as yet not more than well started by the end of 1946. (See also STRATEGIC MINERAL SUPPLIES, and articles on individual metals and minerals.)

(G. A. Ro.)

Mineralogy

Minerals and mineral products being essential not only to highly mechanized civilization, but also in modern warfare, many significant advances were made in mineralogy during the decade 1937–46. Among the important contributions to the winning of World War II made by mineralogists, the most noteworthy were (1) the improve-

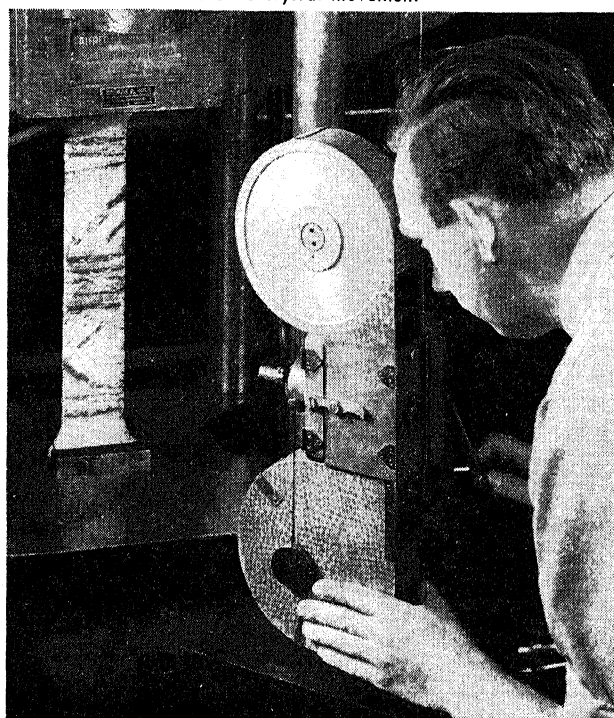
ment of radio and electronic apparatus by the extensive use of piezoelectric oscillating quartz plates; (2) the production of synthetic rubies and sapphires and their fabrication into bearing jewels for precision instruments; (3) the production of wire-drawing diamond dies and bonded diamond wheels.

Oscillating Quartz Plates.—Although piezoelectric oscillating quartz plates had been in use from 1930 for controlling radio frequency, the annual production of these tiny, thin plates, some about half the size of an ordinary postage stamp, was relatively small and was expressed in thousands. Immediately following the attack on Pearl Harbor, the enormous demand for these plates for use in war matériel necessitated the production of tens of millions annually. This was caused by the many applications of the plates, summarized as follows: (1) For frequency or wave length control in radio transmitters and receivers, and as multivibrators for providing frequency and time standards in place of tuning forks, clocks, etc.; (2) in sending and receiving elements for the transmission of sonic or supersonic waves through air, liquids, or solids; (3) as the sensitive element for pressure gauges used for measuring pressures in engine or compression cylinders, in gun and cannon barrels, etc.; (4) in audio or radio frequency filters used for the multitransmission of messages over a single wire circuit, or one radio channel.

During World War II, these plates permitted the radios in planes, ships, all sorts of vehicles and in walkie-talkies to keep tuned to the proper station. In fact, the extensive and complicated systems of radio communication so necessary for the successful prosecution of the war would have been impossible without the use of these oscillating quartz plates.

In making possible this enormous production, new methods and apparatus had to be devised. This required the close co-operation of expert crystallographers and mineralogists with technologists and industrial managers. The achievements, which were truly spectacular, were recorded in the "Symposium on Quartz Oscillator Plates."

Hydraulic tensile machine making motion picture recordings of atomic crystal movement



published in the May-June 1945 issue of the *American Mineralogist*. Without the services of Harry Berman, C. Frondel, K. S. Van Dyke, S. G. Gordon, J. S. Lukesh, W. Parrish, R. E. Stoiber, C. Tolman and R. D. Butler, the extraordinary demands of the war effort could not have been met. The results achieved were of paramount importance to the radio and electronic industries.

The Brazilian states of Minas Geraes, Goyaz, and Bahia were the principal sources of quartz crystals suitable for oscillator plates. According to W. D. Johnston, Jr., and R. D. Butler (*Bul. of the Geol. Soc. of Amer.*, vol. 57, pp. 601-650, 1946), some crystals weigh up to 40 metric tons, while those of 1 to 5 tons occur in many deposits. The potential reserves of quartz crystals in Brazil are large.

Diamond Dies, Wheels and Tools.—When the nazis overran France, Belgium, and the Netherlands in 1939, the supply of diamond wire-drawing dies and of synthetic rubies and sapphires was cut off. This caused a critical situation, and frantic efforts were immediately made to produce these products in the United States and Great Britain.

Wire-drawing dies were essential in the production of precision wire used in large quantities in the manufacture of radio, electronic and electrical apparatuses. Although very few persons had experience in this field, excellent progress was made. Industry was soon supplied with sufficient quantities of domestically produced diamond dies which gave adequate service. In Great Britain, similar success was achieved.

In order to reduce the time necessary to produce these diamond dies, C. G. Peters and W. B. Emerson of the national bureau of standards in Washington, D.C., devised an electric drilling method for the manufacture of dies of small diameter, called superfine dies. These were commonly designated as triple nought dies, since the diameters were as small as 0.0003 of an in., or three tenths of a mil. By this electric method, the dies could be produced in a small fraction of the time required by the old method.

In addition to the production of diamond dies, the war effort led to the development of bonded diamond wheels, which found wide application for abrasive purposes. These wheels made use of a grade of industrial diamonds, called crushing boart, for which there had previously been no market. During the ten years 1937-46, there was a marked increase in the use of diamond set tools for the precision machining of metal and other parts.

Diamond Gem Industry.—Prior to the war, 95% of the world's supply of cut and polished diamonds was furnished by Belgium, the Netherlands and Germany. When these sources were cut off, efforts were made to expand the diamond-cutting industry elsewhere. This was done in the United States, Great Britain, Palestine, Brazil and South Africa. The success of the gem cutters of these countries in competing with the older industries of continental Europe after the return of peace, however, was highly problematical.

Diamond Symposiums.—The interest in the greatly increased use of the diamond led to the conducting of three symposiums, the first of the kind ever held, in which 14 experts participated. Their papers, which appeared in the *American Mineralogist* vol. 27, pp. 162-191, 1942; vol. 28, pp. 141-150, 1943; and vol. 31, pp. 135-167, 1946, constituted a highly important contribution to knowledge of the properties and uses of the diamond.

Artificial Diamonds.—Many experiments were conducted to produce the diamond in the laboratory, and some scientists, notably the French chemist Henri Moissan, were

widely credited as having been successful. However, when the various experiments were repeated, and the products examined with modern optical and X-ray methods, it was shown conclusively that the products were not diamonds. In 1943, A. F. Bannister and K. Lonsdale (*Mineralogical Magazine*, London, vol. XXVI, pp. 315-324) announced that J.B. Hannay had actually made the diamond in 1880. This statement was based upon the examination by modern X-ray methods of specimens found in the mineral department of the British museum and allegedly made by Hannay. While the methods used by Bannister and Lonsdale and their identification of the specimens were not open to question, their conclusion that the specimens were actually made by Hannay was not justified by the available facts. Accordingly, up to 1946, no incontrovertible proof had ever been presented that the diamond had been made artificially.

Large Diamonds.—In July 1938 a diamond weighing 726.6 carats, called the Vargas, was found in Minas Geraes, Brazil. It was purchased and cut by Harry Winston, Inc., of New York city. The weights of the largest 16 stones varied from 48.26 to 10.05 carats. Another large diamond weighing 770 carats was reported Jan. 1945 from Sierra Leone, Africa, which was claimed to be the largest diamond ever found in alluvial deposits. The Liberator, weighing about 155 carats, was the largest diamond ever found in Venezuela. Purchased in 1943 by Harry Winston, Inc., it was cut into four stones ranging in weight from 39.8 to 1.44 carats. It was reported in 1943 that the Punch Jones of 34.36 carats had been found in 1928 at Petersburg, West Va., and was the largest diamond ever recovered from alluvial deposits in the United States. (See also DIAMONDS.)

Synthetic Rubies and Sapphires.—In the production of all kinds of precision instruments such as watches, chronometers, and electrical meters, another critical situation was caused by World War II. There was a greatly reduced supply of small jewels and hard bearing parts made of synthetic rubies and sapphires necessary in the manufacture of these instruments. Prior to the war, synthetic rubies and sapphires were made and fabricated into jewels and bearings in Switzerland, France and Germany. As the rest of the world had depended upon these sources, it was necessary to develop new industries in the United States and Great Britain. In the United States, the Linde Air Products company, Inc., attacked the problem energetically and with great success. An efficient plant was built at South Chicago, and U.S. industrial needs were adequately met. The methods of production and fabrication were greatly improved and highly mechanized. In Great Britain, where satisfactory results were also achieved, plants were developed at Salford and Manchester.

Technical Journals.—To disseminate information concerning the rapidly expanding industrial uses of the diamond, a monthly journal, the *Industrial Diamond Review*, was founded in Great Britain in Dec. 1940. For three years, it appeared as a section of the *Goldsmith's Journal of London*. The success of this pioneer publication was immediate, and it later appeared as an independent journal. Shortly before World War II, a journal of applied mineralogy, *Die Zeitschrift für Angewandte Mineralogie*, was founded in Germany.

Large Laboratory-Made Crystals.—In the construction of some scientific instruments, e.g., those used in infra-red and ultra-violet spectroscopic research, large crystals are necessary. Since sufficiently large crystals and of the re-

quired purity are not found in nature, techniques were developed during 1937-46 whereby laboratory-made crystals of sodium chloride, potassium bromide, lithium fluoride and sodium nitrate, weighing up to 35 lb., became available. By using large prisms made from these crystals, some spectroscopic analyses could be made more rapidly and accurately than by chemical methods.

Crystallographic Union.—With the introduction of X-ray and electron diffraction methods, the study of crystals and crystal structure was greatly extended. By 1946, crystal studies were being conducted by crystallographers, mineralogists, physicists, chemists, metallurgists and biologists. The accumulated information had become so large and so widely distributed in many different scientific publications, that the formation of an International Crystallographic union in London was contemplated in 1946, to foster close co-operation among the various specialists.

Roebling Medal.—In order to recognize more fully meritorious achievement in mineralogical science, the Mineralogical Society of America established the Roebling Medal in honour of Washington A. Roebling, one of the builders of the Brooklyn bridge and a leading mineral collector of his time. Awards during the decade were made to C. Palache, Cambridge, Mass. (1937); W. T. Schaller, Washington, D.C. (1938); L. J. Spencer, London, England (1940); E. S. Larsen, Jr., Cambridge, Mass. (1941); E. H. Kraus, Ann Arbor, Mich. (1945).

Dana's System of Mineralogy.—Because of its long and honourable record, the publication in 1944 of vol. one of the seventh edition of *Dana's System of Mineralogy* was an event of great significance in U.S. science. The first edition of this widely used reference work was issued in 1837 and it had long been characterized as a scientific bible. The new edition by C. Palache, H. Berman and C. Frondel, of Harvard university, incorporated the many scientific advances made in the study of minerals after the last edition appeared in 1892. The elements, sulphides, sulphosalts and oxides were described in vol. one of the new edition.

Public Interest.—During the decade 1937-46, the general U.S. public became more mineral- and gem-conscious than ever before. This was the result of (1) the widespread publicity given to the need and availability of strategic minerals, e.g., those containing uranium and thorium in the development of atomic energy; (2) the marked increase throughout the country in the number of mineralogical organizations and journals devoted to the study, collecting, and displaying of minerals and the cutting and polishing of those suitable for gem purposes; (3) the many popular magazine articles and books dealing with minerals and gems which had appeared in late years. (See also GEOLOGY; MINERAL AND METAL PRODUCTION AND PRICES.)

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Mineral Pigments

Production of iron oxide and earth pigments in the United States was stimulated by the cutting off of imports during the years of World War II. Production statistics were reported only after 1942, as follows in short tons: 1942-97,327; 1943-100,216; 1944-97,018; 1945-101,014. Imports of the major types (not total imports) declined from 18,488 tons in 1939 to 1,459 tons in 1943, recovering to 6,049 tons in 1945. (G. A. Ro.)

Mines, Marine

See SUBMARINE WARFARE; WORLD WAR II.

Miniature Photography

See PHOTOGRAPHY.

Mining

See MINERAL AND METAL PRODUCTION AND PRICES.

See also under separate minerals.

Minnesota

A north central state of the United States, popularly known as the "Gopher state," Minnesota has an area of 84,068 sq. mi., of which 4,059 are water. Population (1940) 2,792,300 (estimate, July 1, 1944, 2,508,663). Of the total population, 50.2% was rural; the native-born white inhabitants in 1940 numbered 2,474,078, foreign-born, 294,904 and Negro, 9,928.

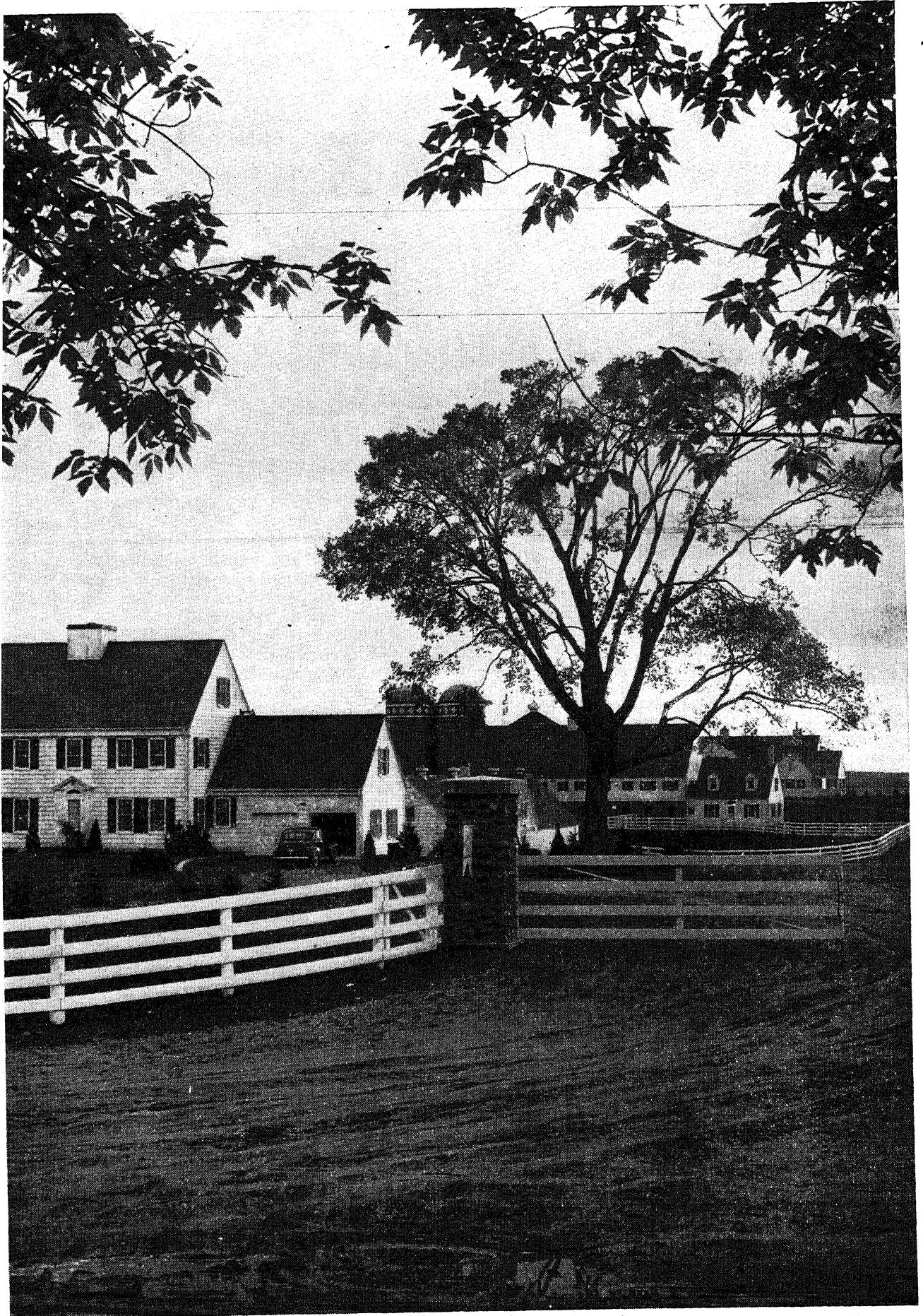
Capital, St. Paul (287,736). The only city in the state with a larger population was Minneapolis (492,370); Duluth had 101,065.

Principal officers of the state at the beginning of the decade 1937-46 were: governor, Elmer A. Benson; secretary of state, Mike Holm; treasurer, C. A. Halvorson; auditor, Stafford King; attorney general, William S. Ervin; commissioner of education, John G. Rockwell; chief justice, Henry M. Gallagher.

In the 1937 legislative session the Farmer-Labor party attempted to fulfil its mandate from the 1936 elections. Governor Benson, inaugurated Jan. 5, proposed reforms in education, taxation, conservation, labour and other fields. Clashes between a conservative senate and a Farmer-Labor house impeded action. A deadlock on tax measures prolonged the session beyond the legal deadline, and a special session was called. Out of the two sessions emerged a dozen tax bills effecting increases in virtually all taxes save the property tax. Other legislation included acts establishing county welfare boards; creating a state geographic board; amending the Workmen's Compensation law to require all employers to carry compensation insurance; eliminating state levies on homesteads; extending highway traffic regulation and authorizing cities and villages to acquire recreational facilities and operate programs of public recreation. A study of state and local government, made under gubernatorial authority, eventuated in a state finance and tax survey and a demand by the governor for elimination of overlapping activities, for reorganization and for economy.

State officers elected in Nov. 1938 were governor, Harold E. Stassen; secretary of state, Mike Holm; treasurer, Julius A. Schmah; auditor, Stafford King; attorney general, J. A. A. Burnquist. The commissioner of education was

Co-operative farming in Minnesota, as illustrated by this unit of three well-kept farms at Excelsior. Despite a high diversification of crops, Minnesota continued to lead the U.S. in butter production, and supplied much of the dairy produce shipped to U.S. armed forces overseas as well as to the United Kingdom, during World War II



John G. Rockwell; chief justice, re-elected, Henry M. Gallagher. The total vote was the largest ever cast in an off-presidential Minnesota election. Harold E. Stassen, a Republican, won the governorship by a vote of 678,839 against 387,263 for Elmer A. Benson (Farmer-Labor), 65,875 for Thomas Gallagher (Dem.) and 899 for John W. Castle (Industrial). Republicans won a landslide victory, gaining all state offices and control of the legislature. In the congressional race seven Republicans and one candidate each for the Democratic and Farmer-Labor parties were elected. The new governor advocated civil service for state officeholders, improvement of social security laws, reorganization of state departments, reduction of state tax on property, labour relations legislation and the building up of industry to reduce unemployment. He opposed a sales tax.

The 1939 legislature met from Jan. 3 to April 19, enacting every proposal made by Governor Stassen to the legislature in his inaugural message. Headlining the list was a sweeping reorganization act, which abolished three administrative boards and consolidated many others. A civil service department was set up, headed by a three-man board and a director, Kenneth Pennybaker, with control over more than 12,000 state employees. The Labor Relations act, one of the significant new laws, stressed arbitration and conciliation; other laws were the Loan Shark act and the Homestead Lien on old-age pensioners. The four-cent gasoline tax was continued until Sept. 1940, and the royalty tax on iron ore was increased 1%. The executive council, the state board of control and the commissioner of administration and finance were replaced by the commissioner of administration, the social security department and a single tax commissioner. At the end of 1939 the governor said that the state debt had been cut by more than \$5,000,000 and he reported economies in the cost of state government.

From April 1939 to June 1940, following the passage of the labour conciliation law, 39 strikes resulted from a total of 553 notices given, and wage losses from strikes in the state were cut in half. Labour disputes affected a farm implement machinery company, a power company, metal products, laundries, ice cream companies, a refrigerator company and nine foundries. The federal government intervened in settling the refrigerator strike so that work could proceed on national defense contracts. WPA spent an estimated \$44,637,086 in Minnesota in 1940, giving work to a monthly average of 39,921 persons. Joseph H. Ball was appointed to fill the vacancy in the senate caused by the death of Ernest Lundeen. Ernest L. Olrich was appointed co-ordinator for the state Defense Industrial commission. Governor Stassen was selected to give the keynote address at the Republican National convention held in June.

In the Nov. 1940 presidential election, Roosevelt secured 644,196 votes, Wendell L. Willkie 596,274. Governor Stassen was re-elected by a plurality of 200,000 votes. Sen. Henrik Shipstead, who withdrew from the Farmer-Labor party to join the Republican ranks, won a fourth term. Republicans elected their entire state ticket and eight of the nine congressmen. The Farmer-Labor party ranked second in the voting on state offices, but the Democrats increased their strength to a marked degree. Conservatives had

strong control of both houses of the legislature. Other officers re-elected were: lieutenant governor, C. Elmer Anderson; secretary of state, Mike Holm; treasurer, Julius A. Schmahl; auditor, Stafford King; attorney general, J. A. A. Burnquist; chief justice, Henry M. Gallagher.

During 1941 the legislature adopted a broader child-welfare program, provided for the enlargement of the Gillette State Hospital for Crippled Children, improved the labour conciliation law, amended the unemployment compensation law, provided for paying rural credit losses and liberalized the old-age assistance lien.

Stassen, Holm, Schmahl, King, Burnquist, and Gallagher were all re-elected in 1942. The entire Republican ticket carried the elections. Ed Thye, whom Stassen selected as his running mate, was elected as lieutenant governor. Special interest centred in Thye's election because Governor Stassen had announced that he would resign to enter active service in the navy when the legislature adjourned; thus the lieutenant governor would be his successor. Joseph H. Ball was elected U.S. senator by a large majority, and Arthur E. Nelson was chosen to fill the short-term vacancy. The dominant note in Minnesota was war-mobilization of industry, intensified mining, accelerated agriculture, bond sales, the development of munitions plants and the departure of men for the armed forces. (T. C. B.; X.)

The 1943 session of the legislature passed more laws (666) than any Minnesota legislature from 1891; much of the increase was due to the number of salary increase laws, made necessary by the rising cost of living. A war-powers act was passed giving the governor special emergency powers. A state department of aeronautics was established and charged with the licensing of pilots and administration of airport laws. Laws were passed for the relief of servicemen, and a fund of \$2,500,000 was to be set aside to aid veterans and their families. Other legislation included acts establishing the Iron Range and Rehabilitation commission, increasing from 9 to 10½% the tax on iron ore, revising the income tax law, suspending the money and credit tax for 1943-44, increasing old-age pensions to \$40 and raising the amount of aid to dependent children.

Minnesota: Statistical Data

Table I.—Education (Public)

	1938	1941	1942	1943	1944	1945
Elementary pupils	390,944	318,921	316,695	315,224	308,692	309,934
High school pupils	139,848	192,433	187,612	187,807	164,373	160,515
Elementary teachers	14,242	13,260	12,956	12,546	12,196	12,007
High school teachers	7,000	8,488	8,344	7,953	7,578	7,516

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1943	1944	1945
Cases on general relief	44,684	35,948	23,303	12,250	7,074	5,587
Cost of general relief	\$1,163	\$795	\$477			
Recipients of old-age pensions	65,098	62,908	63,081	61,938	58,892	56,033
Cost of pensions	\$1,329	\$1,351	\$1,349			
Dependent children receiving aid	17,009	21,220	22,284	18,881	14,524	12,450
Blind receiving aid	760	935	975	1,025	966	940
Workers under unemployment compensation	397,142	418,600				

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1940	1942	1943	1944
Highway mileage	11,360	11,328		11,267	11,247	11,233
Expenditure on highways	\$25,130	\$22,412	\$31,275			
Railroad mileage	8,463	8,458	9,199	9,097	8,365	9,081

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1943	1944
State revenue	\$104,823	\$124,779	\$122,971	\$56,452	\$57,391	\$64,988
State expenditure	\$102,711	\$118,866	\$97,797	\$53,637	\$49,301	\$57,515
Number of banks	688	688	683	677	674	673
Total bank deposits	\$941,600	\$938,500	\$969,400	\$1,291,288	\$1,768,531	\$2,157,379
Number of national banks	195	193	191	186	185	184
Deposits of national banks	\$658,127	\$679,654	\$744,933	\$919,648	\$1,310,906	\$1,595,435

Minnesota: Statistical Data (continued)

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1941	1943	1944	1945
Leading crops (bu.):						
Barley	51,536	59,808	44,980	22,718	13,844	13,224
Corn	172,368	204,796	197,868	215,468	253,399	217,248
Flaxseed	4,077	12,230	14,858	15,456	6,514	11,913
Hay (tons) . . .	4,737	4,773	5,672	5,480	6,172	6,290
Oats	165,321	151,652	116,019	142,791	155,960	242,640
Potatoes, white .	24,411	20,315	18,204	23,571	15,334	19,360
Wheat	35,784	22,108	20,506	18,008	21,508	20,689

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1940 (est.)	1944 (est.)	1945 (est.)
Wage earners . . .	89,925	79,753	118,945	214,593	229,000
Wages paid	\$107,393	\$96,887	\$168,125	\$502,762	\$485,000
Value of products .	\$937,463	\$845,772			

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940	1944	1945
Total value of production . . .	\$152,107	\$51,425	\$106,427			
Leading products:						
Iron ore	\$141,543	\$44,362	\$97,114	\$118,948	\$163,802	\$154,546
Coke	5,611	4,496	3,685	3,663		
Stone	1,991	1,914	2,339	1,988		
Sand and gravel .	1,905	1,587	1,942	1,925		
Clay	969	1,004	1,029			

Maximum benefits under the unemployment compensation law were raised from \$16 to \$20 a week, and an act extended workmen's compensation to cover all occupational diseases.

The real estate levy was cut from 9 mills to 6 mills the first year and to 5½ the second year.

A special session of the legislature convened on March 8, 1944, to give the men and women of the armed forces the right to vote. On April 5 the Farmer-Labor party, which had its first ticket on the state ballot in 1918 and dominated the state from 1930 to 1938, merged with the Democratic party under the title Democratic-Farmer-Labor party. In the November election, Pres. Roosevelt received 589,864 votes and Thomas E. Dewey 527,416. Edward J. Thyne was elected governor by a plurality of 271,053 votes. He received 701,185 votes, the largest number ever received by a gubernatorial candidate in the state's history. All the Republican state office incumbents were re-elected. Dean M. Schweickhard was elected commissioner of education by the state board of education. An aviation amendment to the constitution was passed, giving the state permission to expend funds for development of airports and an airport system, to levy taxes on gasoline used for aviation purposes and a state tax on aircraft in lieu of the personal property tax. (L. BE.; X.)

The legislature, meeting in regular biennial session in 1945, devoted itself largely to preparations for the demands expected in the postwar period. It authorized appropriations of \$19,512,000 for state buildings and improvements. The Minnesota highway department arranged for a program of highway building, which with federal aid, was expected to make possible \$74,000,000 of construction in the first three postwar years. A postwar planning commission was established to stimulate and co-ordinate postwar planning. An act was passed authorizing a veterans' service officer in each county. Funds for old age assistance, aid to dependent children, aid to blind and aid for local schools were increased. (L. BE.; E. J. TE.; X.)

In Nov. 1946, Luther W. Youngdahl was elected governor for 1947-48; Edward J. Thyne was elected United States senator. The 54th session of the legislature, meeting in regular biennial session in 1945, devoted itself largely to preparations for the demands expected in the postwar period, including authorization for a state building program, creation of a postwar planning agency and authoriza-

tion for each of the 87 counties to appoint a veterans' service officer. No special sessions were held during the interim.

(R. B. J.)

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Minor, Robert

Minor (1884–), U.S. communist leader, was born July 15, 1884, in San Antonio, Tex. His father was a schoolteacher, lawyer and district judge, and his mother was a member of Gen. Sam Houston's family. Young Minor attended school only four years and in his teens worked as a messenger boy, sign painter's apprentice and carpenter. For a time he was cartoonist on the *San Antonio Gazette* and the *St. Louis Post-Dispatch*. In 1907 he joined the Socialist party, dividing his time between cartooning and political activities. Later he was cartoonist for the *New York World*, then for the socialist newspaper, the *New York Call*. In 1916-18 he was an organizer for the International Workers' Defense league, handling publicity in the Tom Mooney case. He was a war correspondent in Russia in 1918, and from 1924-26 lectured for the Communist party. Chosen editor of the *Daily Worker* in 1928, he was communist candidate for mayor of New York city in 1933 and for governor of New York in 1936. When Earl Browder, leader of the U.S. Communist party, was imprisoned in 1941 for passport fraud, Minor, assistant general secretary, became acting general secretary of the party. Minor was removed from the national committee of the party in July 1945, at the same time that Browder was deposed from the leadership.

Minorities

The importance of minorities grew in the 20th century with the spread of democracy and the ideal of self-determination of all peoples. The existence of national minorities and their dissatisfaction had been one of the factors leading to World War I. The Ottoman empire (until 1913), the Austro-Hungarian monarchy and the Russian empire were outstanding examples of states containing national minorities which were dissatisfied under the impact of the nationalism which spread in the 19th century. Germany had in its Polish provinces, in Schleswig and in Alsace-Lorraine, Polish, Danish and French minorities which longed for independence. In western Europe, the Irish in the British Isles, the Catalans in Spain and the Flemish in Belgium presented similar problems. After World War I the Irish and Flemish problems were solved by the political developments in Great Britain and Belgium, and the peace treaties of Paris in 1919 reduced considerably the number of minorities living under alien rule in central and eastern Europe.

The frontiers drawn at Paris and by the events in Russia corresponded more faithfully to the ethnical conditions than they did prior to 1914. Many small nationalities which had been deprived of their independence for a long time, regained it from the Baltic sea to the Adriatic. For historical, economic and strategic reasons, however, the new frontiers left large minority groups outside the countries where their conationals formed the majority of the population. In view of the impossibility of creating ethnographically clear-cut boundary lines, the peace treaties devised a new and progressive system of protection for racial, linguistic and religious minorities through the League of

Nations, to assure the remaining minorities equality of treatment in the new states, where also democratic constitutions newly introduced after western models assured all inhabitants full civic rights and equal status. This system of protection for the minorities broke down in the 1930s with the weakening of the League of Nations and with the advance of antidemocratic forms of government in central Europe.

The following list gives approximate figures for those national minorities in central and central-eastern Europe which in 1938 were of sufficient importance, either by their numbers or by their aspirations, to be of real or potential political importance. Figures marked † represent approximations between widely differing estimates; * signifies that the country in question was subject to League minority obligations.

*Albania (pop. 1,003,124, census 1930): †Greeks 50,000.

*Bulgaria (pop. 6,090,215, census 1934): Turks 578,000; Rumanians 69,000.

*Czechoslovakia (pop. 14,729,536, census 1930): Germans 3,318,000; Magyars 719,000; Poles 81,700; Carpatho-Ukrainians 569,000.

*Estonia (pop. 1,126,413, census 1934): Russians 92,000; Germans 16,000.

*Greece (pop. 7,336,000, census 1940): †Bulgarians 82,000; †Turks 103,000; †Albanians 20,000.

*Hungary (pop. 8,688,319, census 1930): Germans 478,630; Slovaks 104,819; Croatians 27,683; Rumanians 16,221.

Italy (pop. 42,993,602, census 1936): †Croatians and Slovenes 600,000; †Austro-Germans 200,000.

*Latvia (pop. 1,905,502, census 1935): Germans 62,000; Russians 233,000; Byelo-Russians 36,000; Poles 50,000.

*Lithuania (pop. 2,549,668, census 1938): Germans 71,000; Poles 73,000; Russians 44,000.

*Poland (pop. 32,106,400, census 1931): Ukrainians 4,200,000; Byelo-Russians 1,500,000; Russians 56,000; Lithuanians 300,000; Germans 1,700,000; Jews 2,700,000.

*Rumania (pop. 18,025,237, census 1930): Bulgarians 361,000; Germans 740,000; Magyars 1,426,000; Ukrainians 577,700; Russians 415,200; Turks 288,800.

Turkey (pop. 17,820,950, census 1940): Greeks 119,800; Armenians 64,700; Kurds 1,184,000.

*Yugoslavia (pop. 13,934,038, census 1931): Albanians 342,000; Germans 499,300; Magyars 468,000; Rumanians 229,800; Turks 132,000.

Breakdown of the System of Guarantees.—In the wave of aggression which spread over Europe after 1938, all protection and all democratic guarantees for minorities were destroyed. The dissolution of Czechoslovakia was followed in the same year by the conquest of Poland and the partition of that country between Germany and the U.S.S.R. In many cases of aggression or interference the principle of "protection of national minorities" or of "national self-determination" was used for purposes of expansion; thus Germany claimed those parts of Czechoslovakia inhabited by Germans (the Czechoslovak Sudetenland), while the U.S.S.R. claimed for protection of "racial brethren" the eastern parts of Poland, inhabited largely by Ukrainians and Byelo-Russians, and later the Czechoslovak Carpatho-Ukraine. In conformity with its principles of racial equality, the populations incorporated into the soviet union were treated on a footing of equality and were granted linguistic autonomy, but they were completely co-ordinated with the totalitarian regime existing throughout the soviet union. National socialist Germany, on the other hand, planned to reorganize Europe, not on the basis of equality of all peoples nor with an international protection for minorities, but on a hierarchical basis in which the German race would have the fullness of rights everywhere, while other peoples would be subordinated according to the needs and will of the German

"master race." Minorities would be protected, if at all, by Germany alone and according to its conception of the worth and value of each individual people and each individual minority.

The new frontiers established in central and eastern Europe between 1939 and 1941, partly as a result of German-Russian collaboration, brought many German minorities under new governments. While Germany wished some German minorities to remain in their countries—Czechoslovakia, Hungary, Rumania—to enjoy special privileges and to act as guardians of German influence, it tried to remove the German minorities from territories which fell under soviet domination. These minorities, although they had lived in their homelands for centuries, were removed forcibly and resettled in territory with non-German majorities but now under German control in an effort to Germanize these districts. With German aggression against the U.S.S.R. in June 1941, nazi domination was extended far into eastern Europe; there the Germans applied everywhere with utmost ferocity their theories of racial inequality; especially were the Slav peoples considered as helot races. The worst treatment by far was meted out to the Jews.

Yet all these changes of frontiers, dismemberments of existing states and forcible shifts of population, did not solve the minorities problem. Throughout the world the troubled period tended to create new problems and to accentuate existing ones on account of the fear of the possible use of minorities as "fifth columnists." The Italians used the small Albanian minority in the Greek Epirus as a pretext for their invasion of that country in 1940. The Germans tried to make dormant minority problems in the Low Countries and in France more acute. They favoured the Flemish nationalists in Belgium and even supported for a brief time a Breton independence movement against France. The victory of Gen. Franco in Spain was inimical to the Catalan and Basque minorities; their autonomy was taken away, and they were subjected to a ruthless process of forced assimilation. In the middle east, the Azerbaijan and Kurdish minorities in Iran were used

"It Must be Something He Ate," Thomas' cartoon version in *The Detroit News* of the old political adage that he who swallows minorities swallows poison



in 1946 by the soviet union as a weapon for interference in, and control of, Iran, and in a similar way alleged or real grievances of the Kurdish minorities in Turkey and Iraq and even "historical claims" of former Armenian and Georgian minorities on Turkish territory were cultivated with the goal of subjecting Turkey and other middle eastern countries to outside control. This rapid deterioration of international law and morality made the problem of minorities increasingly acute, after the actual hostilities of World War II had ceased in 1945.

Problems of the Peace.—In the peace settlements of World War II, minority problems played a great role. Thus they presented potential material for conflict in the drawing of the Italian frontiers, where the territory of Venezia Giulia with its principal city of Trieste was disputed between Yugoslavia and Italy, and the German South Tyrol between Austria and Italy. The German minority problem in Czechoslovakia and Poland was "solved" by the expulsion of the minorities in spite of the fact that they had been settled in their homelands for many centuries. This worked special hardship in the case of Poland, where the Germans were expelled from all the German provinces (eastern Prussia, Silesia, Pomerania) which Poland annexed from Germany in 1945. These lands, emptied of their German inhabitants, were to be resettled by Poles who had left the eastern Polish provinces annexed by the U.S.S.R. Czechoslovakia faced the problem of resettling those of its districts which had been inhabited by Germans. The German minority in Rumania was reported to have been largely sent to the U.S.S.R. for reconstruction work. The soviet union abolished the rights of autonomy of some of its national minorities which apparently had proved unfaithful to the soviet regime during the German occupation. They lost not only the rights of a national minority but were partly transferred to Siberia or other distant parts of the soviet union.

Minority problems also continued in southeastern Europe. Greece claimed the northern Epirus from Albania. Yugoslavia, following the example of the soviet union, tried to solve its minority problem by establishing racial equality on a federative basis. Under communist leadership a federation of the six nationalities forming Yugoslavia was established. One of these federated nationalities was Macedonia, which in turn raised the question of the future of Greek Macedonia and of Bulgarian Macedonia.

The most serious minority problem was presented by the Mohammedans in British India. In fact it was difficult to speak in this case of a minority. According to the census of 1941, India included 92,058,096 Mohammedans who showed a faster increase of population than did the Hindus. The Mohammedans demanded independence from Hindu rule and the formation of a Moslem India (Pakistan) which would include the areas in northwestern and in eastern India where Mohammedans form the majority. Thus, like other minorities and "oppressed" nationalities the Mohammedans in the Indian empire raised the demand for national self-determination. (See INDIA.)

But in a world where ever-higher forms of integration seemed desirable and necessary, national self-determination ceased to be an ideal solution. It had been shown too often in modern history that national independence neither promoted the cause of world peace nor guaranteed individual liberty and respect for legal equality and human dignity. The rights of the individual and the assurance of universal peace and constitutional progress might be more important considerations, in a world which had witnessed totalitarianism and world wars, than national independence. An international bill of rights might assure

individuals and national groups their rights and liberties within supranational federations and unions. By such measures the legitimate claims of minorities could be better safeguarded than by the redrawing of frontiers, the formation of new states or the creation of new independent nations which within themselves could harbour new minorities and create new and maybe worse minority problems.

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Minor League Baseball

See BASEBALL.

Mint, United States

See COINAGE.

Miquelon

See FRENCH COLONIAL EMPIRE.

Missions, Foreign

The decade of 1937-46 was eventful for foreign missions. The spread of Christianity among non-Christian peoples continued to be almost exclusively by Roman Catholics and Protestants (if Protestantism be made to include the Anglican communion).

World War II broke upon the foreign enterprise of both these branches of the Christian movement when they were on the ascending scale. Roman Catholics were experiencing a striking growth in several nonoccidental lands, notably in equatorial Africa, China, and the Netherlands Indies. Catholic missions were dependent chiefly upon western Europe, especially France, Germany, Italy, Spain, Belgium and the Netherlands. The Roman Catholics of the United States were taking an increasing share in the missions of their church, especially in the far east.

Protestant Christians in nonoccidental countries were steadily mounting. This was seen especially in Africa south of the Sahara, in India, in the Netherlands Indies and in China. Protestants were also rapidly increasing by conversions in several traditionally Roman Catholic lands, among which Brazil, the Philippines and Mexico were conspicuous. At the end of Dec. 1938 the (Protestant) International Missionary council held a decennial meeting at Tambarem, on the outskirts of Madras, and through it gave a striking impetus to the growth of the "younger churches," the product of 19th and 20th century missions.

To this advancing foreign missionary enterprise, World War II brought marked embarrassment. The Japanese invasion of China in July 1937 brought dislocation to the churches in most of China and distress to the Christians of Japan and Korea. Among the millions of migrants from occupied to Free China were thousands of Chinese Christians and hundreds of missionaries. Many Christians and their missionary colleagues remained in occupied China and ministered to the needs of the non-Christian population. After Pearl Harbor, British and U.S. missionaries in occupied China were interned. In Japan, the government brought increasing pressure on the churches. Protestants were constrained to form a unified "Church of Christ in

Japan," and a certain amount of co-operation between Roman Catholics and Protestants was enforced. Even before Pearl Harbor, Christians were required to join in the observances of state Shinto, and foreigners in all administrative posts were replaced by Japanese. In Korea the Japanese government, fearing that the churches would be centres of disaffection, insisted that Christians go to the Shinto shrines and attempted to consolidate the churches in that land with those in Japan proper.

The outbreak of war in Europe in Sept. 1939 and the engulfment in 1940 of Norway, Denmark, the Netherlands, Belgium and France by the Germans brought serious problems to both Roman Catholic and Protestant missions. German missionaries in British and Dutch colonial possessions were interned. Financial support could no longer come to missionaries from their constituencies in Germany and German-occupied countries. Hostilities made increasingly difficult the sending of new recruits from the British Isles and the United States and the return of missionaries to their homelands for needed furloughs.

These events were harder on Roman Catholic than on Protestant missions, for the former depended more for money and personnel upon the continent of Europe than did the latter.

The Japanese advance after Dec. 1941, disrupted most of the Christian missions in Burma, Siam, Indo-China, the Malay Peninsula, the East Indies, the Philippines and some of the islands of the Pacific. Missionaries, along with other occidentals from lands at war with Japan, were imprisoned or interned. Many Christians perished in the fighting or the suffering which attended the fighting. The Japanese attempted to bring together the various Protestant denominations in the lands which they overran and to make the churches subserve the purposes of Japanese imperialism.

In the Indonesian independence movement which followed the defeat of Japan, many Christians were killed, for in Java nationalism had a fanatical anti-Christian Moslem phase.

In spite of these handicaps, and in part because of them, Christian missions displayed vitality in adjusting themselves to the situation and in continuing.

The Roman Catholics of the United States in part made up for the loss of financial support from Europe. Moreover, kept out of large parts of east Asia by the Japanese, American Roman Catholic missionaries began going to Latin America, either to the non-Christian Indians or to care for the nominally Christian elements of the population. In 1945 the pope gave vivid demonstration of the world-wide character of the church by placing a Chinese in the list of new cardinals. The indigenous clergy and episcopate, already prominent, became more important. In China and in equatorial Africa the totals of Roman Catholics seemed to persist in their advance.

Through the International Missionary council Protestants cared for missionaries cut off from their constituencies. The International Missionary council brought into being the Orphaned Missions fund. Through this fund, contributions from Great Britain and North America were distributed to missionaries of German or German-occupied lands regardless of their denominational affiliations. So far as the administrators of the fund could learn, no unit of missionary work was discontinued from lack of money.

Moreover, in several areas, Protestantism was actually strengthened during the war. This was true in Free China,

e.g., the large influx from occupied China led to the founding of congregations, the transfer of Christian schools and the undertaking of new enterprises among non-Christians. Some of this was temporary and would not continue after the refugees had returned to their former homes. Some seemed to be more permanent. Even in many parts of occupied China the churches grew in numbers and in self-support in spite of inflation. Yet leaders were weary and some perished. Protestants from the United States, like Roman Catholics from that country, gave more attention to Latin America. The difficulties of travel made large accessions to missionary staffs difficult, and Roman Catholic leaders in the United States vigorously denounced what seemed to them trespassing on territory which was rightly theirs. But Protestantism continued to advance in much of Latin America, especially in Brazil.

In the course of the war, gifts to missions continued in Germany and in some of the lands occupied by Germany, notably in the Netherlands. The funds so gathered could not be sent out of the country, but they were evidence of a persistence in missionary purpose. In the Netherlands, candidates for missionary service were recruited and trained against the day when the way would once more be opened to send them.

The end of World War II did not bring a restoration of *ante bellum* conditions. These had gone forever. In some areas, especially in the Netherlands East Indies, political unrest made the task of missions difficult. In some others, such as Burma and large parts of China, internal disorder retarded the renewal of missionary staffs. In parts of India nationalist agitation rendered the place of the foreign missionary uncomfortable.

However, measures were taken to rebuild and to improve on earlier methods and plans. Large numbers of new missionaries were sent out, especially from the United States. Many old missionaries returned to their stations. The Japanese appeared to be singularly open to the Christian message, but destruction of church buildings had been heavy and it was only slowly that permission for the return of missionaries was obtained. Efforts were made by the Christian forces to relieve the widespread famine in India and China. Co-operation between Protestant denominations had been improved during the war, and that advance continued after hostilities ceased. To the International Missionary council was added the World Council of Churches. The constitution for this body was drafted in the spring of 1938. While it had not formally come into being by the end of the decade 1937-46, it was actually functioning. More than 90 churches had joined it. Most of these were Protestant, but there were a few of the old Catholic and Orthodox bodies as well. While most of the "younger churches" in nonoccidental lands were not yet included, and the World Council of Churches was primarily American and European, plans were being prepared to give the nonwestern Protestant bodies larger participation.

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(K. S. L.)

Mississippi

A southern state of the United States, Mississippi was admitted to the Union in 1817 and is popularly known as

the "Magnolia state." Area 47,716 sq.mi., of which 296 sq.mi. are water. Population (1940) 2,183,796, of which 432,882 or 19.8% was urban. In 1940 there were 1,106,327 whites; 1,074,578 Negroes; 2,177,324 native born; 6,472 foreign born. On July 1, 1944, the bureau of census estimated the population at 2,175,877. Capital, Jackson (62,107). Other cities: Biloxi (17,475); Greenville (20,892); Gulfport (15,195); Hattiesburg (21,026); Laurel (20,598); Meridian (35,481); Natchez (15,296); Vicksburg (24,460).

During the decade 1937-46 Mississippi retained its tradition of voting a solidly Democratic ticket. For the period 1936 to 1940 the principal officers of the state were: governor, Hugh L. White; lieutenant governor, J. B. Snider; secretary of state, Walker Wood; attorney general, Greek L. Rice; state tax collector, James B. Gully; treasurer, Newton James; superintendent of education, J. S. Vandiver; presiding officer of the senate, Lieutenant Governor J. B. Snider; presiding officer of the house of representatives, Fielding L. Wright. In the 1936-40 period the state senate had 49 members in addition to the presiding officer; the house of representatives had 139. In the membership of the legislature farmers predominated with a total of 89 in the two houses; lawyers, 51; teachers, 45; merchants, 14; insurance agents, 12; with 22 other occupations represented by from 9 to 2 members.

The units of local government for practically all purposes of the state continued to be the counties and supervisors' districts, the term of all state and county officers four years, except for the six members of the state supreme court (elected for eight-year terms).

For the period 1940-44 the principal state officers elected were: governor, Paul B. Johnson; lieutenant governor, Dennis Murphree; secretary of state, Walker Wood; attorney general, Greek L. Rice; tax collector, Carl N. Craig; treasurer, Lewis S. May; superintendent of education, J. S. Vandiver; presiding officer of the house of representatives, Sam E. Lumpkin. In the membership of the legislature (1940-44) farmers predominated with a total of 67 in the two houses; lawyers, 59; teachers, 23; merchants, 9; insurance agents, 5; and representation from 13 other occupations. In the presidential election of 1940 the distribution of votes in the state was as follows: Democratic 168,267, regular Republican 2,814, Independent Republican 4,549, Socialist 193.

In 1942 the constitution of 1890 was amended to provide for a constitutional board of trustees for institutions of higher learning and in reference to the sale and lease of 16th section lands. The chief accomplishments of the legislative session of 1942 were slightly decreased tax rates, increased support for pensions and education, provision for a compilation of the general statutes of the state and the establishment of a reformatory for Negro juvenile delinquents, a board of pardons, a state civilian defense council and a vocational school for the adult blind.

In the Aug. 24, 1943, primary Thomas L. Bailey was elected governor with 143,153 votes as against 125,882 received by Martin S. Conner, former governor. For 1944-48 the elected officers of the state, chosen in the Democratic primary, were: governor, Thomas L. Bailey; lieutenant governor, Fielding

L. Wright; secretary of state, Walker Wood; attorney general. On Dec. 26, 1943, Governor Paul B. Johnson died at his home in Hattiesburg, and was immediately succeeded by Lieutenant Governor Dennis Murphree.

The results of the presidential election in the state, Nov. 7, 1944, were as follows: Democratic votes 158,515, Independent Republicans 7,859, Republicans 3,742.

For 1944-48 the elected officers of the state, chosen in the Democratic primaries in Aug. 1943, and in the general election of that year, were: governor, Thomas L. Bailey; lieutenant governor, Fielding L. Wright; secretary of state, Walker Wood; attorney general, Greek L. Rice.

Gov. Bailey died Nov. 2, 1946, and Lt. Gov. Wright succeeded to the office, to serve until Jan. 1948. Oscar Wolfe became presiding officer of the state senate until Jan. 1948. (W. D. McC.; C. Cs.; A. B. Bu.; X.)

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Mississippi: Statistical Data

Table I.—Education (Public)

	1936	1938	1942	1943	1944	1945
High schools		660	624	675	665	665
Elementary school pupils	543,320	522,309	525,229	512,959	487,330	489,666
High school pupils . . .	64,716	67,899	75,359	74,344	67,426	
Elementary teachers . . .	11,208	12,182		16,409	15,551	15,551
High school teachers . . .	2,459	3,402				

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1939	1940	1941	1943	1944
Cases on general relief . .	1,392	1,013	1,166	745		
Cost of general relief . .	\$4	\$4	\$9	\$3		
Recipients of old-age pensions	18,788		21,510	26,621	29,040	29,017
Dependent children receiving aid			162	2,713	3,261	3,462
Blind receiving aid	375		780	1,071	1,443	1,524
Workers under unemployment compensation . .	108,444	104,246	104,700		300,000	

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1943	1944
Highway mileage		5,794	6,240	6,266	6,443	6,446
Expenditure on highways .	\$30,637	\$25,815	\$29,677	\$5,552	\$4,305	\$3,126
Railroad mileage	3,962	3,957	3,921	3,937	3,947	3,947

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1940	1944
Wage earners	46,040	46,359		163,892
Wages paid	\$26,384	\$27,437		\$201,790
Value of products	\$190,671	\$174,937	\$179,144	\$358,000

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1942	1943	1944
Total mineral production	\$4,822	\$5,210	\$5,192	\$29,726		\$18,988
Leading products (value):						
Natural gas	3,041	3,210	3,300	220	385	314
Sand and gravel	1,008	1,247	811	3,021	1,099	877
Crude oil				26,359	18,430	16,800

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1944	1945
State revenue	\$40,635	\$43,125	\$39,813			
State expenditure	\$40,159	\$47,493	\$27,316			
Number of banks	207	206	205	192	202	202
Total bank deposits	\$181,800	\$187,800	\$191,800	\$388,873	\$626,965	\$788,718
Number of national banks . .	25	25	24	24	23	23
Deposits of national banks . .	\$65,577	\$66,555	\$75,541	\$126,687	\$182,189	\$230,239

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1943	1944
Acreage, principal crops	7,513	7,011	7,167		7,018	7,386
Income from crops and livestock	\$169,300	\$137,218	\$111,884	\$293,910	\$347,098	\$359,467
Leading crops (bu.):						
Corn	45,378	35,488	40,544	49,198	43,508	42,224
Cotton (bales)	2,692	1,582	1,250	1,968	1,841	1,937
Oats	1,428	2,736	3,776	9,000	9,000	15,096
Peanuts (lb.)	14,560	13,500	13,500	25,000	23,750	12,555
Pecans (lb.)	8,176	7,018	2,717	5,400	9,000	8,300
Potatoes, sweet	7,544	6,142	4,485	6,460	6,970	6,248
Hay (short tons)	983	1,140	1,223	1,127	1,007	1,139

184 Missouri

A west north central state of the United States, Missouri was admitted to the Union in 1821; popularly known as the "Show Me" state. Area 69,674 sq.mi., of which 404 are water. Pop. (1940) 3,784,664 (51.8% urban, 48.2% rural); 3,425,062 (90.5%) native white, 114,125 (3%) foreign-born white and 244,386 (6.5%) Negro. On July 1, 1944, the bureau of census est. the pop. at 3,589,538. Capital, Jefferson City (1940, 24,268). Largest cities: St. Louis (816,048), Kansas City (399,179), St. Joseph (75,711), Springfield (61,238).

Principal state officers for the 1936-40 period were: governor, Lloyd C. Stark; lieutenant governor, Frank G. Harris; secretary of state, Dwight H. Brown; auditor, Forrest Smith; treasurer, R. W. Winn; attorney general, Roy McKittrick; superintendent of schools, Lloyd W. King. Missouri's representation in congress consisted of two Democratic senators (Bennett Champ Clark and Harry S. Truman), 12 Democrats and 1 Republican in the house of representatives. The vote for governor in 1936 was Stark (Dem.) 1,037,133 and Barrett (Rep.) 772,934.

The 1938 election did not lessen the numerical preponderance of the Democratic party's membership in congress.

The outstanding event of 1939 was the crippling of the powerful Pendergast political machine (Democrat), previously weakened by federal convictions growing out of the 1936 election frauds. Gov. Stark's appeals to Pres. Roosevelt instigated action by the U.S. treasury and justice departments, which, following U.S. District Attorney Milligan's efficient prosecutions for income tax evasion, resulted in the imprisonment at Leavenworth of boss Thomas J. Pendergast and four of his henchmen. The state then broke the machine's control over the Kansas City police, and helped federal authorities in destroying its influence in the WPA in Missouri. The 60th session of the general assembly (Jan. 4-June 24, 1939), voting about \$232,000,000 for various purposes, appropriated more money than any assembly in the state's history. Among the more important laws enacted were: placing the Kansas City police department under control of a board consisting of the mayor and four commissioners; making need the determining factor in granting old-age assistance; lowering old-age assistance eligibility from 70 to 65; extending the 2% sales tax until Dec. 31, 1941; directing Lincoln university to provide Missouri Negroes "opportunity for training up to the standard furnished" by the University of Missouri.

During 1940 Missouri was the scene of several political battles. They began when U.S. Sen. Clark clashed with Gov. Stark for control of the Democratic state convention. Clark was the victor; the convention, dominated by the Dickmann-Hannegan machine, the "courthouse rings," and the remnants of the Pendergast machine, adopted a platform barely mentioning Stark's administration. The same factions were again victorious in the Democratic primary on Aug. 6. Gov. Stark and former U.S. District Attorney Milligan both entered the senatorial race but were defeated by U.S. Sen. Truman, incumbent. In the November election the Republican candidate, Forrest C. Donnell, with the support of his own party and some of the antimachine Democrats, defeated the Democratic candidate, Lawrence McDaniel, by a plurality of 3,613. The rest of the principal state officers elected were Democrats: Frank G. Harris, lieutenant governor; Dwight H. Brown, secretary of state; Forrest Smith, auditor; Wilson Bell, treasurer; Roy

S. McKittrick, attorney general. Elected to the state senate were 28 Democrats and 6 Republicans, to the house of representatives 85 Democrats and 65 Republicans. A constitutional amendment was adopted providing for a nonpartisan system for the nomination, appointment and election of judges of certain courts.

The popular vote for president was Roosevelt 958,476; Willkie 871,009; for U.S. senator, Truman (Dem.) 930,775, Davis (Rep.) 886,376. Congressmen elected included 10 Democrats and 3 Republicans.

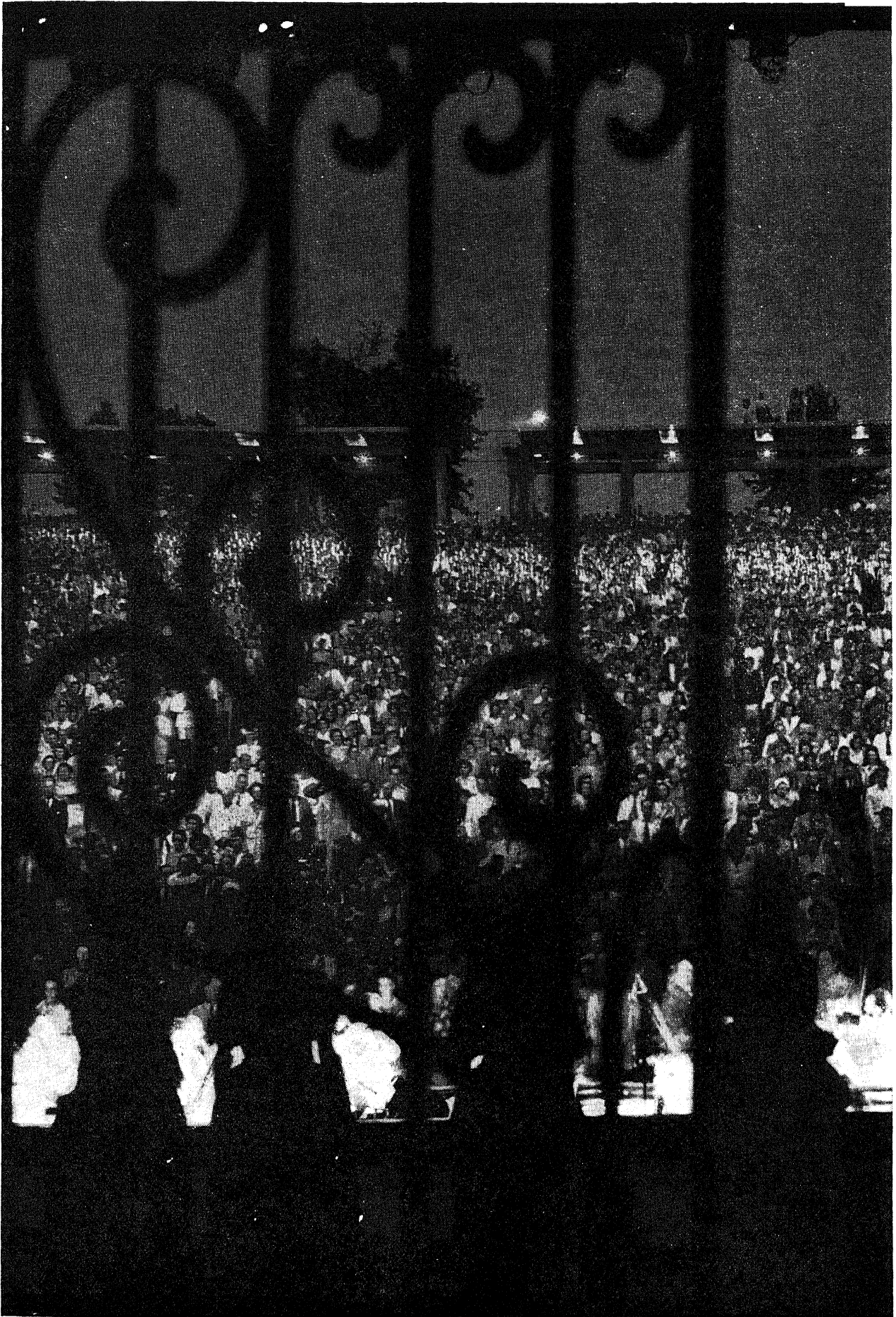
The 61st session of the general assembly (Jan. 8-July 12, 1941) remained in session longer than any previous assembly. Controlled by the Democrats, it attempted to prevent the inauguration of Gov. Donnell (Rep.); but on Feb. 26, as the result of a state supreme court decision, Donnell was inaugurated. Then the assembly, on petition of the unsuccessful Democratic candidate, Lawrence McDaniel, ordered a recount of the gubernatorial vote. On May 21, with the recount about half finished and with Donnell's plurality considerably increased, the assembly, at McDaniel's request, dismissed the contest. The legislature also enacted laws establishing a state defense council, a secret ballot and the control of congenital syphilis. In addition, it resolved to submit two constitutional amendments to the electorate in 1942: one to repeal the nonpartisan court amendment, the other to increase the pay of members of the legislature.

In the election of Nov. 3, 1942, the Republicans made substantial gains in Missouri. Eight Republicans and five Democrats were elected to the U.S. house of representatives, a gain of five seats. For the state senate 18 Democrats and 16 Republicans were elected (a Republican gain of 10 seats), and 95 Republicans and 55 Democrats were elected to the house (the first Republican majority since 1928). The voters approved a constitutional amendment to increase the pay of the legislature but rejected an amendment to repeal the nonpartisan court amendment. They also approved a proposed convention to revise the state constitution. During a special session of the assembly the governor asked for appropriations of about \$2,536,020, to provide funds for state departments and institutions for the remainder of 1942. However, the assembly appropriated \$5,203,469, adding funds for deficiencies previously incurred by some of these agencies. Donnell maintained that appropriations for such deficiencies were unconstitutional. He therefore vetoed these items and approved appropriations amounting to only \$2,335,653.

The 1943 regular session of the general assembly appropriated more than \$255,000,000 for the 1943-44 biennium, the largest sum in Missouri's history. Laws were enacted providing for a three-day waiting period for the issuance of marriage licences; serological tests for marriage licence applicants; a revision of the civil procedure and corporation codes; a permanent joint committee on legislative research; the establishment of teachers' pension and retirement funds by the three largest cities; a soil conservation commission; a revision of the state food and drug laws; an absentee ballot for members of the armed forces. The assembly defeated the governor's proposals to establish a state merit system and consolidate the state's tax collection agencies.

The legislature proposed two constitutional amendments: the first, approved by the voters at a special election on April 6, 1943, provided that all laws, except appropri-

Audience of more than 10,000 persons singing the U.S. national anthem before the start of an outdoor performance at the St. Louis Municipal opera, St. Louis, Mo., in July 1942. Darkened stage can be seen in foreground



ation laws, should become effective 90 days after enactment; the second, to be passed on by the voters in 1944, would give the legislature power to direct the investment or disbursement of county school funds for public school purposes. At the special election on April 6 the voters chose 83 delegates to a convention to revise the state constitution.

A special session of the legislature March 15-April 8, 1944, appropriated \$3,180,000 for the social security program, and liberalized the statutes regulating the absentee ballot for members of the armed forces. The constitutional convention, in session Sept. 21, 1943, to Sept. 29, 1944, drafted a new state constitution, to be submitted to the voters in 1945. The leading members of the convention were: Robert E. Blake (pres.), Allen McReynolds, Charles H. Mayer, Ethan A. H. Shepley, William L. Bradshaw, Franc L. McCluer, Guy B. Park and Richard S. Righter.

Robert E. Hannegan, of St. Louis, was elected chairman of the Democratic National committee in Jan. 1944. At the Democratic National convention on July 21, 1944, Sen. Harry S. Truman received the nomination for vice-president. The popular vote for president was Roosevelt 807,357, Dewey 761,175; for U.S. senator, Forrest C. Donnell (Rep.) 778,778, Roy McKittrick (Dem.) 776,790.

In the state election, Nov. 7, 1944, Phil M. Donnelly (Dem.) defeated Jean Paul Bradshaw (Rep.) by a plurality of 30,489 votes, for the office of governor. The other state officers elected were also Democrats: Walter N. Davis, lieutenant governor; Wilson Bell, secretary of state; Forrest Smith, auditor; Robert W. Winn, treasurer; J. E. Taylor, attorney general. As a result of the election, both houses of the state legislature were Republican, the house consisting of 80 Republicans and 70 Democrats, the senate of 19 Republicans and 15 Democrats.

The outstanding political event in Missouri during 1945 was the adoption of the new constitution on Feb. 27, by a vote of 312,032 to 185,658. The new constitution provided, among other things, for a central revenue bureau, a department of public health and welfare, a commissioner

Table V.—Agriculture (All figures in thousands)						
	1937	1939	1940	1942	1944	1945
Acreage, principal crops	12,874	12,267	12,192	12,408	13,538	12,506
Income from crops and livestock	\$255,200	\$250,782	\$269,409	\$540,000	\$682,923	
Leading crops (bu.)						
Corn	177,720	120,118	119,280	146,899	162,554	105,840
Cotton (bales)	404	437	388	425	411	155
Hay (tons)	2,226	3,239	3,524	4,349	3,481	3,747
Oats	43,400	40,920	48,600	59,427	29,970	31,161
Wheat	42,515	30,429	31,707	9,035	21,998	22,518

Table VI.—Manufacturing (Money figures in thousands of dollars)				
	1937	1939	1943	1945
Wage earners	186,631	178,538	430,500	306,600
Wages paid	\$202,586	\$190,736		
Value of products	\$1,505,383	\$1,388,056		

Table VII.—Mineral Production (All figures in thousands of dollars)						
	1937	1938	1939	1942	1943	1944
Total mineral production	\$52,446	\$39,561	\$45,619	\$76,122		\$72,369
Leading products (value)						
Lead	\$18,600	\$11,226	\$14,690	\$26,739	\$27,737	\$27,949
Cement	7,041	6,871	7,420	11,516	7,024	4,882
Coal	7,978	6,814	6,124	8,372	9,505	11,733
Stone	4,742	4,459	4,590	8,347	5,864	5,312
Lime	2,327	1,724	2,800	4,916	6,046	5,820
Clay	4,072	2,815	3,931	2,468	2,539	3,205
Sand and gravel	2,481	1,919	2,311	2,932	2,299	
Zinc	2,678	982	1,570	6,769	6,569	8,351
Barite	1,430	1,151	1,164	943	872	

of education selected by a bipartisan board of education, taxation of intangible personal property on the basis of yield, elimination of the fee system for remunerating most state and county officers, magistrate courts with practising lawyers as judges, decennial reapportionment of state senatorial districts, reorganization of county governments, voluntary consolidation or division of counties, a public record of votes on bills by members of legislative committees and state financial support of public libraries.

The work of implementing the provisions of the new constitution fell to the 63rd general assembly, which convened on Jan. 3, 1945, with Republicans in control of both houses. During 1945 there were other events of political importance. On April 12 Vice-Pres. Harry S. Truman succeeded Franklin D. Roosevelt as president of the United States, the first native-born Missourian to hold that office. On Jan. 12 the governor appointed Frank P. Briggs (Dem.) to succeed vice-president elect Truman as U.S. senator.

The 63rd general assembly (Jan. 3, 1945-Dec. 12, 1946) was in session 23 months and 10 days—the longest session on record—although the house met on only 230 legislative days and the senate on 253. Besides passing laws implementing the new constitution, the general assembly enacted legislation providing for the extension of the merit system of personnel administration.

In the election of Nov. 5, 1946, the Republicans made substantial gains. The popular vote for U.S. senator was James P. Kem (Rep.) 572,556; Frank P. Briggs (Dem., incumbent) 511,544. Nine Republicans and four Democrats were elected to the national house of representatives, a Republican gain of three seats. The Democratic candidate from Pres. Harry S. Truman's home district, who was supported by the president, was defeated. The Republicans retained control of both houses of the state legislature.

(R. P. Br.; X.)

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Missouri: Statistical Data

Table I.—Education (Public)

	1938	1940	1942	1943	1944	1945
High schools	941	943	987	867	832	861
Elementary school pupils	544,971	506,173	505,159	508,529	483,513	473,418
High school pupils	160,641	198,864	193,138	159,549	148,305	147,426
Elementary teachers	18,628	18,311	17,987	17,358	17,363	16,983
High school teachers	7,270	8,058	8,208	7,867	7,088	6,281

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1943	1944	1945
Cases on general relief	35,593	23,633	19,879	15,488	15,939	19,838
Cost of general relief	\$490	\$277	\$265			
Recipients of old-age pensions	74,434	92,032	113,787	108,708	103,402	100,406
Cost of pensions	\$1,375	\$1,481	\$2,040			
Dependent children receiving aid	19,090	26,519	32,297	29,084	27,271	20,080
Blind receiving aid	3,900	3,655	3,207	3,032	3,001	2,950

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1940	1942	1943	1944
Highway mileage	15,484	15,790	15,869	16,116	16,131	16,147
Expenditure on highways	\$23,625	\$23,894	\$27,553	\$23,825	\$18,953	\$20,208
Railroad mileage	7,337	7,076	7,042	6,939	6,913	

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
State revenue		\$86,967	\$114,591	\$115,282	\$113,795	\$113,439
State expenditure		\$81,605	\$76,611	\$111,426	\$99,681	\$103,868
Number of banks		668	636		566	563
Total bank deposits		\$1,359,500	\$1,501,400		\$1,962,554	\$2,412,375
Number of national banks		86	86		83	81
Deposits of national banks		\$620,676	\$736,619	\$551,440	\$799,852	\$955,983



Admiral Mitscher, commander of task force 58, switching to another warship via bosun's chair from his flagship, the carrier "Bunker Hill," which lay blazing from the hits of two Japanese suicide planes off Okinawa on May 11, 1945

Mitscher, Marc Andrew

Mitscher (1887–), U.S. naval officer, was born Jan. 26, 1887. He entered the navy in 1906, joined the naval air force in 1915 and had advanced through the grades to vice-admiral by 1944. He was in command of the aircraft carrier "Hornet" when that vessel carried Gen. "Jimmy" Doolittle's army bombers within 800 nautical mi. of Japan to bomb Tokyo on April 18, 1942. Mitscher's carrier task force participated in the battle of Midway in June 1942, the air attacks on Guadalcanal in 1943 and virtually every important naval operation in the Pacific war theatre in 1944 and 1945. In June 1944 Mitscher was selected to command task force 58, then described as the "most powerful and destructive naval unit in the history of sea warfare." During that year Mitscher's force took part in the Marshalls invasion, the attack on Truk, the Marianas invasion, the battle of the Philippine sea, the Luzon and Formosa raids and the battle for Leyte gulf. In March and April of 1945, the carrier planes of Mitscher's task force slashed targets in Japan and the Ryukyus. Mitscher was relieved as commander of the 1st carrier force in July 1945, and was returned to Washington, D.C., as deputy chief of naval operations for air. In Jan. 1946 he was made commander of the 8th fleet in the Atlantic.

Mohammedanism

See ISLAM.

Molasses

See SUGAR.

Molotov, Vyacheslav Mikhailovich

Molotov (1890–), soviet statesman, was educated at Petersburg polytechnic and during his youth organized bolshevist student groups and worked for the newspaper *Pravda*. The revolution of Feb. 1917 found him a member

of the Petrograd soviet executive committee. In 1920 he was appointed secretary of the central committee of the Communist party of the Ukraine, and the following year he held this office for the whole of the U.S.S.R. He was named president of the soviet of people's commissars in 1930. In May 1939 Molotov succeeded Maxim Litvinov as foreign commissar, an appointment which foreshadowed the shift in soviet foreign policy leading to the nazi-soviet pact of nonaggression, signed by Molotov in Moscow on Aug. 24, 1939. He resigned as premier of the U.S.S.R. in May 1941 and was succeeded in this office by Stalin; he remained as foreign commissar, however, and took over the vice-premiership. Three weeks after the German invasion of the U.S.S.R., Molotov signed, on July 13, 1941, the British-U.S.S.R. mutual-aid pact in which each nation agreed not to make a separate peace. In Aug. 1942 Molotov was named vice-chairman of the people's council of commissars.

Molotov attended most of the major international conferences held among the Allied leaders between 1942 and 1946, including the Moscow parleys in 1944 and the Yalta meeting and San Francisco conference in 1945. As soviet representative at the foreign ministers' conferences which met in Paris in June and July of 1946 to draft proposals for the peace treaties, and at the peace conference itself which followed, Molotov frequently clashed on matters of policy and procedure with James F. Byrnes, the U.S. representative, and Ernest Bevin, British foreign secretary.

Molybdenum

The United States remained the world's foremost producer of molybdenum during the decade 1937–46. From 91% of the world total in 1939, the percentage increased to more than 93% in 1941, but declined to 87% in 1944, as other countries responded to war demand. Mexico and Chile led among the minor producers.

Molybdenum was undergoing a spectacular boom in production even before it was still further expanded by the demands of World War II. Output increased tenfold between 1925 and 1935, and tripled between 1935 and 1939. The peak war output in 1943 was double that of 1939, a change which in comparison with the tripling in the preceding four years, actually marked a slackening of the previous rate of increase. The impact of the war on molybdenum demand was really double-barrelled, as the industry not only had to supply a greatly increased amount to meet the expanding consumption in the normal uses of the metal, but also large amounts to serve as a substitute for tungsten.

At the same time that molybdenum production reached its peak in 1943, tungsten also was more plentiful, and between then and the end of the war the consumption demand dropped by about one-half. Another slackening of demand followed the end of the war in Europe, and a still further drop after the surrender of Japan. During the

Metal Content of Molybdenum Concentrates, United States
(Thousands of pounds of metal content)

	Production	Shipments*	Consumption	Industrial	Stocks	Total
				Metals	Reserve	Stocks
1937	29,419	30,122	?	?	—	?
1938	33,297	25,727	?	?	—	?
1939	30,324	32,415	?	?	—	?
1940	34,313	25,329	?	?	—	?
1941	40,363	38,377	16,891†	21,226	?	?
1942	56,942	66,437	56,388	12,540	?	?
1943	61,667	53,955	49,891	17,993	2,167	20,160
1944	38,679	39,423	31,520	19,335	3,973	23,308
1945	30,802	32,524	32,696	16,899	4,746	21,645
1946‡	6,665	4,150	6,124	17,597	4,523	22,120

*Including exports. †Second half only. ‡First half.

first half of 1946, production averaged 1,111,000 lb. per month and consumption 1,021,000 lb., with small additions being made to stocks. The 1946 rate of production was less than half that of 1937, before the war demand started—probably the result of stocks on hand that were equivalent to nearly two years' consumption at the prevailing rate of demand. (G. A. Ro.)

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Monaco

A principality situated on the Mediterranean, Monaco is surrounded on the landward side by the French department of Alpes Maritimes. Area, 370 ac. (0.59 sq.mi.). Population (census, 1939), 23,973 (Italians 9,724; French 8,540; British 1,902; United States 270; Monegasques 1,761; others 1,776). Towns: La Condamine (pop. 11,341); Monte Carlo (10,683); Monaco (1,940). The ruler of Monaco throughout the decade 1937–46 was Prince Louis II, who had succeeded on June 26, 1922; he was aided by a national council of 12 members elected for 4 years.

The effect of the outbreak of World War II on Monaco's tourist trade was to present it with a budgetary deficit of £62,500, which meant that for the first time its citizens were threatened with the imposition of income tax. It was estimated, however, that the state could live on its reserve fund of £227,000 for a period of two and a half years.

In spite of Italian claims after the fall of France, Monaco remained a French protectorate, and British residents were allowed to remain. French citizens were allowed to enter the state for a visit limited to one fortnight. By the end of 1942, German and Italian troops were stationed in the principality, which had become a curious oasis in war-stricken Europe, where food and goods unobtainable elsewhere on the continent could be had at high cost.

In Sept. 1942 the prince of Monaco rejected an Italian demand that a blackout be imposed. A German diplomatic representative was installed in Monaco in Aug. 1943, for the first time since 1906. With the threat of Allied invasion early in 1944 all foreigners were ordered to leave by March 15, but on Dec. 17 after the liberation of France, it was announced that they would be allowed to remain for an indefinite period.

On June 23, 1944, the Princess Charlotte, heir to the throne, renounced her rights in favour of Prince Rainier, her son.

Monaco's neutrality was strictly observed by the Germans, and the only damage to its buildings was inflicted by one bomb. At the end of the war plans were started for restoring the peacetime tourist industry. The International Sporting club and seasons of opera and ballet in the old Monte Carlo tradition were reopened.

On July 24, 1946, Prince Louis married Mlle. Ghislaine Dommanges, a naturalized citizen of Monaco. (J. R.A.)

Monazite

Most of the world's supply of monazite, the chief source of thorium, cerium and the other rare earth metals, continued to be beach deposits on the coasts of Brazil and India, with smaller amounts from Netherlands East Indies. The United States consumption was met entirely from imports, which were as follows, in short tons of gross weight, the actual monazite content not being specified:

	1937	1939	1941	1943	1945
Gross imports	336	1,560	3,448	4,980	549
Brazil	336	54	734	1,911	437
India	..	1,336	2,714	3,033	112
Neth. East Indies	..	170	..	..	..

An iron alloy of the rare earth metals was the spark producer in the pocket lighter, and thorium had long been used in gas mantles; oxides were used in polishing glass and other compounds in the mildew-proofing of textiles. But these and numerous other uses were dwarfed by the possible use of thorium in atomic fission. (G. A. Ro.)

Monetary Units

See EXCHANGE CONTROL AND EXCHANGE RATES.

Mongolia

Geographically and politically, Mongolia is divided by the Khalka river into Outer Mongolia, with an area of approximately 622,744 sq.mi., and Inner Mongolia, with an area of approximately 334,100 sq.mi.

Outer Mongolia, a territory of about 850,000 population, assumed international significance in 1921 when a tsarist refugee from the Russian Revolution of 1917, Michael von Ungern-Sternberg, made the city of Urga in Outer Mongolia a base of operations against soviet Russia. Later, soviet troops moved into Outer Mongolia, captured Urga, which was renamed Ulan Bator Khoto, and remained there until May 1, 1925. In 1924, a republic of Outer Mongolia made its appearance, and was promptly recognized by the soviet union through the Soviet-Mongolian Treaty of Friendship of Nov. 5, 1921. On the date of the withdrawal of soviet troops, "the Mongol working people and its government" declared that Outer Mongolia and the soviet union "are bound by an unseverable community of fate, interests, and the great ideas of real rule by the people," and that "in difficult moments" the republic will "firmly trust in the aid of the U.S.S.R. and the Red army."

This state of affairs was viewed with considerable alarm by China. After protracted negotiations, a Sino-Soviet treaty was concluded on May 31, 1924, article v of which provided that "the Government of the U.S.S.R. recognizes that Outer Mongolia is an integral part of the Republic of China and respects China's sovereignty therein." The same article also provided for "the complete withdrawal of all the troops of the U.S.S.R. from Outer Mongolia."

In spite of this treaty, however, a "gentlemen's agreement" was supposed by the U.S.S.R. and Outer Mongolia to have existed between them after Nov. 27, 1934. On the basis of this agreement, the soviet union and Outer Mongolia further concluded, on March 12, 1936, a Protocol of Mutual Assistance, pledging consultation and co-operation in case of danger of attack, including military assistance.

The Chinese government immediately filed a protest against this protocol, basing it upon article v of the Sino-Soviet treaty of 1924. Maxim Litvinov, on behalf of the U.S.S.R., rejected China's protest, although he again affirmed China's sovereignty over Outer Mongolia.

The outbreak of war between China and Japan on July 7, 1937, brought about a treaty of nonaggression between China and the U.S.S.R., concluded on Aug. 21, 1937. During the negotiations of this treaty, the question of Outer Mongolia was discussed, although no mention of the territory was made in the provisions.

Outer Mongolia again assumed international importance when the Soviet-Japanese Neutrality pact of April 13, 1941, was announced. This pact included a declaration which said that the soviet union and Japan "solemnly declare

that the U.S.S.R. pledges to respect the territorial integrity and inviolability of Manchoukuo, and Japan pledges to respect the territorial integrity and inviolability of the Mongol People's Republic."

It will be recalled that the treaty of 1924 between China and the U.S.S.R. specifically stipulated that Outer Mongolia was "an integral part" of China and was so regarded by the soviet union. It will also be recalled that "Manchoukuo" had always been regarded by China and by the rest of the world except the axis powers as a Japanese puppet state. This exchange of pledges between the soviet union and Japan of two territories forming integral parts of China was naturally strongly resented by China and such other nations as the United States which refused to recognize "the fruits of aggression." On its part, the Chinese government promptly issued a formal statement declaring that "the Chinese government and people cannot recognize any engagements entered into between third parties which are derogatory to China's territorial and administrative integrity, and wish to state that the Soviet-Japanese declaration just announced has no binding force whatsoever on China."

During the Yalta conference in Feb. 1945, Outer Mongolia was a subject of discussion between President Roosevelt, Prime Minister Churchill and Marshal Stalin. It was agreed between them that "the *status quo* in Outer Mongolia (the Mongolian People's Republic) shall be preserved," and that President Roosevelt would take measures in order to obtain the concurrence of Generalissimo Chiang Kai-shek on advice from Marshal Stalin regarding the agreement concerning Outer Mongolia. This part of the agreement was made public after the death of President Roosevelt and the defeat of Japan.

The agreement, however, was communicated to the Chinese government immediately after its conclusion. The matter was taken up during the series of conversations between China and the soviet union in Moscow during the spring of 1945, which resulted in the conclusion of a treaty of friendship and alliance between the two nations. In an exchange of letters between the foreign ministers of the two countries, the Chinese foreign minister declared that "in view of the desire for independence repeatedly expressed by the people of Outer Mongolia, the Chinese government declares that after Japan's defeat, if a plebiscite of the people of Outer Mongolia confirms this desire, the Chinese Government will recognize the independence of Outer Mongolia in her existing boundaries." Foreign Commissar Molotov declared, in reply, that the soviet government "will respect the state of independence and territorial integrity of the Mongolian People's Republic."

On Oct. 20, 1945, a plebiscite was held by the people of Outer Mongolia. The Chinese government dispatched an official to observe the plebiscite proceedings; 483,291 votes were reported cast in favour of independence, none against. On Jan. 5, 1946, the Chinese government formally announced that "the result of the plebiscite has confirmed that the people of Outer Mongolia are in favour of independence" and that "this government now recognizes the independence of Outer Mongolia."

In June 1946, the government of Outer Mongolia applied for membership in the United Nations. In the official cable, the prime minister of Outer Mongolia reminded the United Nations "that the people of the Mongolian People's Republic took part in the struggle against Fascist states on the side of the United Nations, having contributed to the struggle by the material resources it had placed at the disposal of its great neighbour, the Soviet Union." The application was taken up during the summer of 1946

but was rejected by the Security council.

Inner Mongolia is a geopolitical term describing an area within the territorial confines of China. In this area, the ancient politico-religious system of "League" (Meng) and "Banner" (Ch'i) still obtained. Upon this system, the Chinese government superimposed an administrative system of provinces and districts similar to that in other parts of the country.

After the outbreak of war between China and Japan in 1937, the Japanese tried very hard to win the Mongols over. Their area was strategically important, being the shortest international highway between soviet Siberia and north China.

Many Mongol princes defended their land against the Japanese invasion, fighting valiantly on the side of the Chinese government troops. The Japanese persisted, however, to appeal to their aspirations for independence.

In 1936, one of the important Mongol princes, Prince Teh (known as Teh Wang to the Chinese), joined the Japanese. After many reorganizations, the Japanese finally organized the Meng Chiang Tse Chih Cheng Fu, or Mongol Borderland Self-governing government, presided over by Prince Teh, with the capital in Hoko Hoto. This puppet regime disappeared with the defeat of Japan.

The national government of China, through its Commission on Mongolian and Tibetan Affairs, on which Mongol princes and leaders were amply represented, had administered Inner Mongolia in accordance with the principle of nationalism as taught by Dr. Sun Yat-sen, China's revolutionary leader. As stated by Generalissimo Chiang Kai-shek, this principle meant that the government "should accord large and small racial groups inside the provinces legal and political equality, and unhindered economic and religious freedom" and "should in a friendly spirit voluntarily help them to realize their freedom." (C. CN.)

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Montana

A northwestern state of the United States, Montana is popularly known as the "Treasure state." Area 147,138 sq.mi.; population (1940) 559,456. The urban population was 211,535 or 37.8%; there were 540,468 whites, of whom 484,826 were native-born and 55,642 were foreign-born. The Indian population numbered 16,841. Capital, Helena (15,056). Other cities: Butte (37,081); Great Falls (29,928); Billings (23,261); Missoula (18,449); Anaconda (11,004). It was estimated that the population of the state had gone up 40,000 or 50,000 after 1944 (the population was estimated at 464,999 on July 1, 1944).

Roy E. Ayers was elected governor in 1936; Sam Mitchell, secretary of state; Harrison Freeborne, attorney general. In 1938, Jerry J. O'Connell, liberal Democrat, was defeated for re-election to congress. Politics centred on redistribution of tax burdens, improved working conditions, water conservation and irrigation and extension of social security. Farm and labour groups controlled the legislature.

In the quadrennial election of 1940, Sam C. Ford was elected governor (the first Republican governor in 20 years), with a Republican senate and a Democratic house of representatives. Other state officers elected were: Ernest T. Eaton (Rep.), lieutenant governor; Sam Mitchell (Dem.), secretary of state; John J. Holmes (Dem.), audi-

tor; Thomas Carey (Dem.), treasurer; John W. Bonner (Dem.), attorney general; Elizabeth Ireland (Rep.), state superintendent of public instruction, Paul T. Smith (Dem.), railroad commissioner.

Jeannette Rankin (Rep.) and James F. O'Connor (Dem.) were elected representatives to congress. Senator Burton K. Wheeler (Dem.), was chosen for a fourth term in the U.S. senate. President Roosevelt carried the state in 1940 with 145,698 against 99,579 for Willkie; 1,443 for Thomas; 664 for Babson and 489 for Browder.

Measures passed by the legislative assembly in 1941 provided for a survey for reorganization of the state government, the reapportionment of congressional districts, changes in the social security law and proposed changes in the state board of education.

In the general election of 1942 the Republicans gained control of both houses of the state legislature. Mike Mansfield (Dem.) and James F. O'Connor (Dem.) were elected representatives to congress. James E. Murray (Dem.) was re-elected to the U.S. senate. Proposed constitutional amendments for changes in the state board of education and for lengthening the terms of certain county officials from two to four years were voted down by large majorities. State officials in 1942 were: governor, Sam C. Ford; Ernest T. Eaton, lieutenant governor, Sam Mitchell, secretary of state; John J. Holmes, auditor; R. V. Bottomly, attorney general; Elizabeth Ireland, superintendent of public instruction.

In 1943 the state planning board drafted a \$70,000,000 postwar public works program to aid private industry in providing jobs for returning veterans and give the state needed improvements. Highway construction, irrigation of semi-arid farm lands, extension of rural electrification and new buildings and improvements at the state institutions were listed as the main projects to be undertaken. Strenuous opposition developed throughout the state against the army engineers' plan to raise the level of Flathead lake 17 ft. or more, the chief objection being the claim that the economic and social life of some 50,000 Montana people would be disrupted.

In the quadrennial election of 1944, Ford was re-elected governor with both a Republican senate and house of representatives. Other state officials elected were: Ernest T. Eaton (Rep.), lieutenant governor; Sam W. Mitchell (Dem.), secretary of state; R. V. Bottomly (Dem.), attorney general; George P. Porter (Rep.), treasurer; John J. Holmes (Dem.), auditor; Elizabeth Ireland (Rep.), superintendent of public instruction; and Horace F. Casey (Dem.), railroad and public service commissioner. Albert H. Angstman and Edwin K. Cheadle were elected associate justices of the supreme court on a non-partisan ticket. Mike Mansfield (Dem.) and James F. O'Connor (Dem.) were re-elected representatives to congress. President Roosevelt carried the state with a vote of 112,556 against 93,163 for Dewey.

The state planning board—with the same membership as the water conservation and rural electrification boards—made notable progress in 1944 in furthering plans for postwar highway construction, irrigation, rural electrification and the construction of new buildings at the state institutions. Early construction of the authorized \$42,000,000 Hungry Horse dam was approved by state agencies, but the proposed development of the Missouri and Columbia river basins through federal control was looked upon as a sinister threat to Montana's sovereignty.

Congressman James F. O'Connor died early in 1945 and

Montana: Statistical Data

Table I.—Education (Public)

	1938	1941	1942	1943	1944	1945
Elementary school pupils . . .	78,423	75,000	72,542	69,236	66,297	66,303
High school pupils . . .	31,980	32,000	30,035	27,329	25,164	24,605
Elementary teachers . . .	4,012	3,830	3,642	3,514	3,380	3,401
High school teachers . . .	1,456	1,531	1,513	1,425	1,353	1,307

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1942	1943	1944	1945
Cases on general relief . . .	6,270	4,538	3,004	2,230	1,436	1,220	
Recipients of old-age pensions . . .	12,534	12,175	12,464	12,425	11,845	11,176	10,754
Cost of old-age pensions . . .	\$257	\$220	\$254				
Dependent children receiving aid . . .	4,901	5,741	6,411	6,192	6,322	4,987	4,553
Blind receiving aid . . .	99	195	260	316	313	306	322

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1940	1942	1943	1944	1945
Highway mileage . . .	6,231	6,420	6,395	6,563	7,951	7,966	7,963
Expenditure on highways . . .	\$6,113	\$9,119	\$11,741	\$8,196	\$4,491	\$4,228	\$5,466
Railroad mileage . . .	5,203	5,191	5,203	5,203			5,203

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1940	1941	1943	1945
State revenue . . .	\$22,292	\$22,874	\$33,700	\$36,693		
State expenditure . . .	\$20,895	\$14,932		\$37,212		
Number of banks . . .	117	113	112	112	110	130
Total bank deposits . . .	\$131,800	\$135,600	\$145,700		\$283,507	\$412,944
Number of natl. banks . . .	43	43	42	42	41	40
Deposits of natl. banks . . .	\$77,289	\$85,392	\$90,665	\$90,665	\$165,670	\$213,024

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1944	1945
Income from crops and livestock . . .	\$82,800	\$81,912	\$101,426	\$86,598	\$134,429	\$150,000
Leading crops (bu.) . . .						
Alfalfa seed . . .	19	104	185	96	100	88
Barley . . .	2,093	5,088	4,208	12,330	16,290	13,248
Corn . . .	1,251	1,768	2,856	3,800	3,308	2,010
Flaxseed . . .	43	400	990	2,550	1,453	1,410
Hay (tons) . . .	1,416	1,900	1,836	2,759	2,433	2,487
Oats . . .	4,080	8,002	10,574	20,319	15,717	9,486
Potatoes . . .	1,900	1,530	1,840	1,725	2,520	2,016
Sugar beets (tons) . . .	852	894	1,166	947	704	877
Wheat . . .	21,918	51,473	56,070	73,783	73,884	57,726

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners . . .	11,268	9,171
Wages paid . . .	\$15,758	\$12,148
Value of products . . .	\$176,279	151,885

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1939	1940	1942	1944	1945
Leading mineral products (value): . . .						
Copper . . .	\$34,976	\$20,348	\$28,564	\$34,169	\$31,911	\$24,616
Gold . . .	7,079	9,246	9,541	5,141	1,694	1,593
Silver . . .	9,137	6,169	8,790	7,956	5,044	4,422
Zinc . . .	5,092	3,619	6,626	10,177	8,237	6,440

at a special election in June, Wesley A. D'Ewart (Rep.), one of the leading opponents in the state to a Missouri Valley authority, was elected for the unexpired term.

In the 1946 elections, the veteran statesman Burton K. Wheeler, seeking a fifth term in the United States senate, was defeated in the primary by former associate justice Leif Erickson, who in turn lost in the general election to Zales Ecton (Rep.). Mike Mansfield (Dem.) and Wesley D'Ewart (Rep.) were elected representatives in congress. Paul T. Smith (Dem.) was elected railroad and public service commissioner, and Frank Murray (Dem.) clerk of the supreme court on a nonpartisan ticket. Elections for the state legislature returned strong Republican majorities in both houses.

(E. E. B.)

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Monte Carlo

See MONACO.

Montgomery of Alamein, 1st Viscount

Viscount Montgomery of Alamein (Bernard Law Montgomery) (1887–), British army officer, was born Nov. 17, 1887, the son of an Ulster clergyman. He joined the British army in 1908 as a second lieutenant in the Warwickshire regiment and fought in France during World War I. After the armistice, he served as a division commander in Palestine and instructor at the staff college in India. Promoted to the rank of major general in 1938, he was again assigned to Palestine and was stationed there from 1938 to the middle of 1939.

At the outbreak of World War II, Montgomery went to France as commander of the 3rd division. In June 1940, he participated in the evacuation of British troops from Dunkirk. In the summer of 1942, Montgomery, who had been made a full general, was given command of the British 8th army. On Oct. 23, of that year, he launched the celebrated offensive at El Alamein, Egypt, that resulted in the retreat of Marshal Erwin Rommel's Afrika Korps clear across the North African desert to Tunisia. Montgomery also played a major role in the conquest of Tunisia (May 1943), the Sicilian landings (July 1943) and in the initial phases of the Italian campaign (Sept. 1943).

He was later withdrawn to England in preparation for the invasion of western Europe and was field commander of Allied ground forces at the start of the Normandy landings. In Aug. 1944, Gen. Eisenhower split his land forces into two groups, with Montgomery in command of the 21st army group (mostly British and Canadian troops) and Gen. Omar N. Bradley heading the 12th army group (predominantly U.S. troops). On Aug. 31, 1944, King George VI appointed Montgomery field marshal supernumerary. In early 1945, Montgomery's forces participated in the general Allied offensive into the reich, driving through the Netherlands, northern Germany and up to Denmark. On May 4, 1945, all German armies in that area, estimated to have numbered more than 1,000,000 men, surrendered to Montgomery. He was appointed chief of the British occupation forces and member of the Allied control commission in Germany, May 22, 1945.

He was created Viscount Montgomery of Alamein on the King's New Year Honours list, Jan. 1, 1946. Montgomery later relinquished his occupation posts to become chief of the British imperial general staff, April 30, 1946. He visited Washington in Sept. 1946, declaring that he was studying U.S. army training methods. In what was regarded as a reply to criticism from U.S. writers for his alleged delays in attacking in the Caen sector after D-day in 1944, Montgomery, in an article published Sept. 4, 1946, stated that his entire campaign in France after D-day was fought exactly according to preinvasion planning.

Montreal

The principal city of Canada, Montreal is situated in the province of Quebec, on an island at the confluence of the Ottawa and St. Lawrence rivers. The population of Montreal increased, between censuses 1931 and 1941, from 810,925 to 903,007, and for greater Montreal, including its suburbs, from 973,637 to 1,105,359. In 1945, as estimated by *Lovell's Directory*, the population of the city proper was 1,345,000 and of greater Montreal 1,554,000.

The assessed value of real estate for the year 1945 was \$1,281,313,440, of which \$937,763,173 was taxable and \$343,550,267 exempt from taxation. In 1945, building per-

mits were issued for 1,934 new projects with a value of \$16,532,935, and for 2,425 repair jobs having a value of \$5,370,913.

In May 1943 the city defaulted in respect of the principal of certain bonds which became due, but continued to pay interest. A reorganization of the city's finances was effected through the Quebec Municipal commission, which was placed in charge of any municipality defaulting in respect of its bonds. The reorganization was completed, and the control of the Quebec Municipal commission was removed.

The form of government of the city was changed in 1940 from a council consisting of 35 aldermen and a mayor to a municipal council consisting of 99 members, of whom one-third was appointed by certain recognized public bodies, one-third elected by the proprietors alone and one-third elected by the proprietors and tenants, or occupants, of immovable property. The mayor was elected by the citizens generally. The administration of the city remained in the hands of an executive committee chosen by the council, consisting of six members.

In the spring of 1939, King George VI and Queen Elizabeth paid an official visit to the city and signed the Golden Book, the official register of distinguished visitors. They were given a great ovation.

In 1940 the mayor publicly advised the citizens not to comply with the law of the federal government requiring registration of all citizens, for war purposes. He was arrested and confined in a concentration camp but was liberated in 1944 and was subsequently re-elected mayor.

Public education in the city continued to be divided between a Catholic commission and a Protestant commission. The Montreal Protestant Central school board, organized in 1925, received jurisdiction over Montreal proper and the school boards of adjoining municipalities.

In 1940 the rate of taxation on property owned by Roman Catholics was increased from 7 mills to 10 mills, the same as that imposed upon Protestant proprietors. Incorporated companies continued to pay school tax, at the

King George VI signing the city's Golden Book at Montreal, Canada, in May 1939, as Mayor Camillien Houde stood by



rate of 12 mills, into a neutral panel divided between the Roman Catholic and Protestant school commissions. Jewish children attended the Protestant schools. The cost of their education, in excess of the amount paid in taxes by Jewish proprietors, was charged against the neutral panel before division. Both Roman Catholic and Protestant commissions operated at a deficit during the decade. The situation was the subject of elaborate study, notably in the case of the Protestant commission, by a committee headed by W. G. Hepburn.

In 1946, an act of the provincial legislature gave authority to the Catholic school commission to annex and absorb the school municipality of Montreal East. This project was strongly opposed by lay and ecclesiastical authorities and had not been carried into effect by the end of the decade.

(J. A. MA.)

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Mooney, Edward

Cardinal Mooney (1882–), archbishop of Detroit, was born at Mt. Savage, Md., on May 9, 1882, and was ordained priest in 1909. Later he taught at St. Mary's seminary in Cleveland, O., served as head of the Cathedral Latin school from 1916 to 1922, and was spiritual director of the North American college in Rome until Jan. 1926. He was then elected titular archbishop of Irenopolis and named apostolic delegate to India. The first U.S. priest to be given a permanent appointment in the diplomatic service of the holy see, he was later transferred to Japan in the same capacity. An important accomplishment of his five years as delegate to India was the settlement of the so-called "double jurisdiction" question, effected through an accord between the holy see and Portugal. On Aug. 28, 1933, he was named bishop of Rochester, N.Y. With the exception of one year, he held the post of chairman of the conference of the administrative board of the National Catholic Welfare conference from 1935 to 1945. On June 1, 1937, the diocese of Detroit was elevated to the rank of an archiepiscopal see, and the entire state of Michigan was made into a new ecclesiastical province with Archbishop Mooney as its first archbishop. On Feb. 18, 1946, he was proclaimed a cardinal by Pope Pius XII.

Moravia

See CZECHOSLOVAKIA.

Morgan, Arthur Ernest

Morgan (1878–), U.S. engineer, educator and public official, was born on June 20, 1878, at Cincinnati, O. From 1920 to 1936 he was president of Antioch college, Yellow Springs, O., where he instituted the co-operative plan of education of alternate study and work. He was appointed chairman of the Tennessee Valley authority in 1933 and was dismissed by President Roosevelt in March 1938 after a split in the TVA directorate. A suit filed by Morgan charging the illegality of the dismissal was denied by the supreme court in 1941. Among Morgan's later publications were *The Small Community* (1942) and *Edward Bellamy* (1944).

Morgan, Sir Frederick Edgworth

Sir Frederick Morgan (1894–), British army officer, was born Feb. 5, 1894. He was commissioned as a second lieutenant in the royal artillery in 1913 and was sent to

the western front the following year. In 1916, he was appointed a staff captain. He attended the Staff college at Camberley and was a brigade major at the Staff college at Quetta, India. On his return to England in 1936, Sir Frederick was assigned to the war office as a general staff officer. Named to the temporary rank of a brigadier in Aug. 1939, he went overseas in 1940 as commander of a support unit in an armoured division. Just prior to the collapse of France, he returned to England with his unit. In May 1942, he was promoted to the rank of lieutenant general and in April 1943, he was assigned to study and plan the project for the Allied invasion of western Europe. After the war, he was named (Sept. 1945) chief of operations for U.N.R.R.A. in Germany. On Jan. 2, 1946, he was criticized for having made a statement that displaced persons of Jewish origin were "well-dressed, well-fed and rosy-cheeked." This remark and other parts of his statement were branded as anti-Semitic and he was suspended, pending a review of his case. However, he was later cleared by Herbert Lehman, director general of U.N.R.R.A., who asserted that he was satisfied that Morgan did not intend to impute sinister motives to the D.P.'s or the organizations helping them, and that he did not have religious prejudices. Subsequently, Gen. Morgan alleged that the soviet union was using D.P. camps for espionage. Fiorello La Guardia, who succeeded Lehman as U.N.R.R.A. director general, said he had found no evidence to substantiate these charges, and on Aug. 20, 1946, Sir Frederick was removed from his post.

Morgan, (John) Harcourt Alexander

Morgan (1867–), U.S. entomologist and public official, a native Canadian, was born in Strathroy, Ont., on Aug. 31, 1867. After receiving the degree of bachelor of agricultural science at the University of Toronto in 1889, he went to Louisiana State university, where he was entomologist, zoologist and horticulturist. In 1904–05 he directed the state's program for the extermination of the cattle tick and the boll weevil. From 1905 until 1919 Morgan was director of the Tennessee agricultural experiment station and professor of zoology and entomology at the University of Tennessee. He had been appointed dean of the University of Tennessee college of agriculture in 1913, and in 1919 he was named president of the university. President Roosevelt appointed him to the board of directors of the Tennessee Valley authority in 1933. When Arthur E. Morgan was dismissed by Roosevelt on March 22, 1938, Harcourt Morgan was appointed to the chairmanship of the TVA. In Sept. 1941 David E. Lilienthal succeeded him as chairman, and Morgan assumed the post of vice-chairman.

Mormons

Membership of the Mormons (legal name for The Church of Jesus Christ of Latter-day Saints) increased during the 1937–46 decade by 218,764, to a total membership in 1946 of approximately 979,454, of whom 902,311 resided in the United States and Hawaii, 15,363 in Canada, 31,874 in Europe, 5,070 in Latin America, 1,731 in South Africa, 82 in Palestine and Syria, and 23,023 in the Pacific Islands, Australia and New Zealand. Proselyting was being actively carried on in all these areas, though not with so large a force as prior to the World War II.

The missionary work of the church was being done by self-sustaining men and women (before World War II, more than 2,000 of them) called to the service by the church, for periods of from two to two and one-half

years, except that mission presidents continued to serve from three to seven years. The church continued to pay the returning fare of each from his field of labour. The missionaries constituted a revolving group,—a few serving on more than one mission. A large proportion of the church male membership continued to fill missions at some period in their lives, usually while in their early twenties. All American missionaries were withdrawn from European countries at the beginning of World War II, but others were returning as rapidly as circumstances permitted. During the war, the young men who would normally have gone into the missionary work went into military service. There was a total Mormon military force of approximately 90,000 to 100,000 men who came from the church membership in the United States. The membership in foreign countries apparently furnished a proportionate quota.

Welfare.—In 1936, the Church Welfare program was set up to assist those in need of help, by furnishing them, according to the need of the individuals, food, or clothing, or shelter, or all three, with small amounts of cash. So far as possible those helped were expected to render some service therefor. From 17,000 to 50,000 had been given help each year since 1936. A principal feature of the program was the rehabilitation of discouraged individuals who had suffered reverses, making them again self-supporting, self-respecting, independent members of society.

Priesthood Activity.—Every male member of the church, 12 years of age and over, may hold some priesthood rank. There are two grades of priesthood, each divided into groups called Quorums: The Aaronic or Lesser priesthood (groups—deacon [lowest], teacher, priest, with 12; 24 and 48 members respectively in each group of Quorum), and the Melchizedek or Higher priesthood (elders, with 96 in a Quorum, high priests— indefinite number in groups—from whom the presiding officers of the church are drawn; seventies—with 70 in each group; and patriarchs, some 400 or more in the whole church). During the period 1937–46 these groups were intimately integrated in the welfare program, each group being urged to care for the needy members in its own group. The presiding authorities of the church were insistent that the principle of a common brotherhood of men be given practical application. During this period, the presiding bishopric of the church (at the head of the Aaronic priesthood) urgently sought to bring into line with church standards and practices, those who belonged to that priesthood, but had become slack in their observance of its obligations and duties. This group is usually spoken of as “the adult Aaronic priesthood group,” because normally a youth passes from the Lesser to the Higher priesthood when he is 18. The Melchizedek priesthood presiding officers also sought to bring their numbers into greater activity and more close observance of church standards, which include, besides the normal Christian virtues, tithesaying and the nonuse of alcohol in any form, of tobacco, tea, coffee and a temperate use of meat.

Education.—From its beginning the church had fostered education. Utah (predominantly Mormon) had for years stood near the top in states of the United States in standard literary gradings. The church during the period 1937–46, and just prior thereto, made over as a gift to the state of Utah, the junior church colleges it was operating. It then set up throughout the church and in some foreign countries, a considerable number of religious schools, in the neighbourhood of state high schools and colleges, where students might go for one to three hours

per day for religious instruction. Usually the secular schools not only did not oppose, but encouraged the establishment of these church institutions. By 1946, there were some 12 institutes (adjacent to colleges), and 98 seminaries, located near high schools. There were some 23,741 students taking religious training in these schools. In addition to these schools, the church continued to maintain the Brigham Young university at Provo (Utah), a school of recognized excellence in the college grade; a junior college at Rexburg (Idaho) and a high school at Juarez, Mexico. Extensive additions at Brigham Young university and Ricks college (Rexburg) were made, both in buildings and equipment. The church authorized considerable further additions of the same sort. These church schools had an aggregate attendance of about 5,000 students at the end of the decade.

Buildings.—During the decade 1937–46, the erection of new buildings was cut to the minimum. Nevertheless, there were 610 such structures built during that period, including one temple, at Idaho Falls, Idaho. Plans were made for an extensive postwar enlargement of the building program to include two new temples in the California area. Normally, the cost of these buildings (except temples) had been met by the people of the wards raising 50% and the church matching it; in the mission branches, the local participation was less. As it was aimed to keep the wards down to a membership of 500 to 750 members, there was a constant increase in the number of wards. During the period 1937–46, 214 new wards were created. In connection with each ward building, there was a “beautification program,” to landscape the grounds and keep the building itself painted and in good repair.

(J. R. CL.)

Morocco

See FRENCH COLONIAL EMPIRE; SPANISH COLONIAL EMPIRE.

Morrison, Herbert Stanley

Morrison (1888–), British statesman, was born at Brixton, London, on Jan. 3, 1888. Leaving elementary school at the age of 14, he passed through a variety of jobs as errand boy, shop assistant, telephone operator. In 1913 he entered politics and in 1915 (until 1940) was the secretary to the London Labour party. Originally a member of the Social Democratic federation, he later joined the Independent Labour party and then the Labour party. In 1922 he was elected to the London county council. After a term in parliament from 1923 to 1925, he regained his seat in 1929 and served as minister of transport and privy councillor in the second Labour government until 1931.

Dubbed the “organizer of victory,” Morrison created the electoral machine by which the Labour party in 1934 secured control of the London county council and of a majority of the metropolitan borough councils.

Returned to parliament again in 1935, Morrison became one of the three Labour members of the Churchill coalition government in May 1940. He served as minister of supply until October of that year, when he assumed the posts of home secretary and minister of home security. In 1941 he became a member of the war cabinet. With the breakup of the coalition government in May 1945 and the victory of the Labour party in the general election of July, Morrison emerged as leader of the house of commons and lord president of the council.

194 Mortality Rates

See DEATH STATISTICS.

Mortgages, Farm

See AGRICULTURE; FARM CREDIT ADMINISTRATION.

Mortgages, Home

See HOUSING.

Mościcki, Ignacy

Mościcki (1867–1946), Polish scientist and statesman, was born in Russia, and was educated at the Polytechnic school of Riga, where he specialized in chemistry. He fled to England as a political refugee in 1892 to continue his studies. Five years later he was named assistant professor of electrochemistry and electrophysics at the University of Freiburg, Switzerland. Later he returned to Poland, where he accepted the chair of electrochemistry at the Polytechnic school of Lwow (1912). During this period, he instituted chemical research laboratories and developed factories for the manufacture of synthetic fertilizer. He made notable discoveries in connection with oxygenization of nitrogen in air. Noted for having perfected a method of manufacturing synthetic nitric acid, he owned over 600 patents on his many inventions.

Mościcki gave up his academic career to enter politics at the request of Marshal Pilsudski; when the Marshal declined the presidency, Dr. Mościcki was elected May 1926, while Pilsudski assumed the premiership. Mościcki continued to govern the country until Poland was invaded by Germany in Sept. 1939, when he was forced to flee to Rumania. Arriving at Cernauti he proclaimed a Polish government in exile, but 12 days later resigned in favour of Wladislaw Raczkiewicz, who established his government in Paris. An exile in Switzerland after 1939, Mościcki died at Versoix, Oct. 2, 1946.

Moscow

Between 1926, the year of the first complete census after the revolution, and 1939, the population of the Russian capital more than doubled, increasing from 2,029,425 to 4,137,018. But the relative expansion of living accommodation and transport facilities was wholly inadequate, with the result that the congestion of an already overcrowded city became almost insupportable. In the last years before World War II, plans were put into execution not only to accommodate this enlarged population, but also to change the character of the city from that of "an overgrown village," with which it had been content while Petrograd was the seat of government, to that of a fitting capital city of the largest country in the world. This program of development was cut short by the war, but not before it was sufficiently advanced to give an idea of the Moscow of the future. Several spurs of the famous subway, with its ornate, luxurious and often beautiful stations, were completed. The antique tramway system was supplemented by the first trolley-buses of modern design. Fast diesel trains began to serve the suburban lines. But in spite of these promising beginnings, the internal transport system was still overloaded to the point of breakdown in 1946.

The architectural results of this new drive were disappointing. The imaginative functionalism of the first decade of the soviet regime had been severely checked from above. Senior architects forgotten since the revolution found themselves reinstated and assisted at the rebirth of the

"traditional" Russian-Palladian style, as exemplified in the fussy and undistinguished façade of the new Hotel Moskva. The latest school of young architects found its ideal in the wedding-cake style of architecture and its apotheosis in K. S. Alabian's design for the gargantuan palace of soviets as amended by Boris Jorfán. This was planned to be the tallest building in the world (1,365 ft.) with its crowning statue of Lenin, 200 ft. high. This building, to be erected on the site of the 19th century cathedral of St. Saviour's, which was demolished to make room for it, was discontinued at the foundation stage when World War II broke out. The most successful completed building in the new style was K. S. Alabian's Red army theatre, completed in 1940, which ranked in 1946 as the finest theatre in the soviet union.

The architectural developments were paralleled in all the arts. The bold experimentalism of the Moscow artists of the 1920s had been resolutely curbed. The great theatre built for the producer Vsevolod Meyerhold was renamed the Tschaikovsky hall and was being used for concerts. The cry in all the arts was for a mixture of the realistic and the spectacular. Although the Moscow theatre remained the best in the world, it was no longer the most stimulating. It was probable that the period from 1930 onward would become known to historians as the Moscow period, in which cultural progress was checked while its front was broadened. In Sept. 1940 the aesthetic independence of Leningrad, until then jealously guarded, was broken by a purge. Moscow now set the tone for all Russia.

Economically, the most important development in Moscow was the completion in 1937 of the Moscow-Volga canal from the Khimki river, a few miles to the north of the city, to the new Moscow sea, an artificial lake running into the Volga. The completion of this canal in four and a half years turned Moscow into a major inland port with access to the White sea, the Baltic and the Caspian. The journey by water from Moscow to Leningrad was shortened by 685 mi. The canal was 79.5 mi. long, with a depth of 18 ft. and a width of 290 ft., rising and falling through 125 ft. through a series of 11 reinforced concrete locks, each 950 ft. long and 98 ft. wide. The artificial lakes made during its construction supplied Moscow with its drinking water.

The symbolism of the whole achievement was underlined by the magnificence of the architecture of the locks, the engineering works and the terminal ports.

In 1941 all development ceased. In Oct. of that year, after the fall of Mzhaisk, the city found itself just behind the front line and under constant short-range bombing from the air. Children and nonessential workers were evacuated, a midnight curfew was imposed and nobody could live in the city without a special pass. On Oct. 15, when the danger of German encirclement appeared acute, the diplomatic corps, all the Allied missions and the foreign press were evacuated to Kuibyshev (formerly Samara) on the middle Volga. It was this evacuation which gave rise to the false belief that Kuibyshev had become the seat of government. Many government departments were evacuated, but Stalin and the other soviet leaders remained in Moscow under heavy air bombardment and with the German army in Klin, Volokholamsk and Naro-Fominsk, a fact which had a stimulating effect on the morale of the people. Although Moscow was less hit by the bombing than London, the suffering of the people as a result of cold and undernourishment was, by western standards, intolerable, while the innumerable windows smashed by blast made thousands of apartments uninhabitable in the winter cold. Life during the winters of 1941 and 1942 was a



Lenin's tomb in Moscow, with Marshal Stalin and high soviet officials reviewing a show of strength on May day 1941, less than two months before Hitler launched his Russian offensive

bitter struggle for survival. There were no restaurants, and next to no fuel. Theatres that continued to function were unheated. But by the autumn of 1943 there was already a marked turn for the better, and many evacuees were allowed to return, among them most of the theatre companies. By 1945, recovery was almost complete. Rationing was relaxed. Fuel was available. Special shops were opened for the sale of unrationed goods. Already in 1946 the city had a prewar aspect. But the prior claims for the rebuilding of the devastated areas made it likely that renewed development of the capital would be delayed for some time.

(E. CRA.)

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Moscow Conference (Oct. 1943)

See INTERNATIONAL CONFERENCES, ALLIED (WORLD WAR II).

Mosley, Sir Oswald Ernald

Sir Oswald Mosley (1896–), British politician, was born Nov. 16, 1896, and was educated at Winchester and Sandhurst. He served in parliament from 1918 to 1931 as, successively, Conservative, Independent and Socialist, and was chancellor of the duchy of Lancaster from 1929 to 1930. Leaving the Labour party in 1931, Mosley founded the "New party," and later became leader of the British Union of Fascists ("Blackshirts"). He and his party, sympathetic to the continental fascists and akin to them in philosophy and methods, were responsible for propaganda campaigns and riots directed against workers and Jews. In

May 1940, Mosley was arrested and interned in a British concentration camp and the British Union of Fascists was dissolved by government order.

Before the expiration of his sentence, Mosley was released, in Nov. 1943.

Mosquitoes

See ENTOMOLOGY; EPIDEMICS AND PUBLIC HEALTH CONTROL; PUBLIC HEALTH ENGINEERING.

Motion Pictures

From the standpoint of product, motion pictures made notable progress in the decade 1937-46 in countries such as the United States and England where the screen remained free. In once-important areas where the screen came to be regarded as primarily an engine of propaganda, there was a falling off in artistic quality. Popular patronage of motion pictures greatly increased and continued high.

National interchange of pictures became difficult. The United States retained its lead in world markets generally, with England in a challenging position.

Basically, the technique of the motion-picture art was not drastically altered. In the United States, there was a strong trend toward increasing luxuriousness of production, with a similar tendency in England. In the realm of art forms, the major share of experimentation was done by Walt Disney. His innovations were variations of the animated colour picture and had little effect on general production.

The most successful of the Disney pioneering efforts was *Snow White and the Seven Dwarfs* (released in 1938), the first animated feature-length picture. (Animated drawings had previously been restricted to the field of short subjects.) *Snow White* became one of the sensational box-office productions of the motion-picture industry. It was



Robert Donat as the English schoolmaster in *Good-bye, Mr. Chips*, the role which won him the 1939 Academy award as best actor of the year



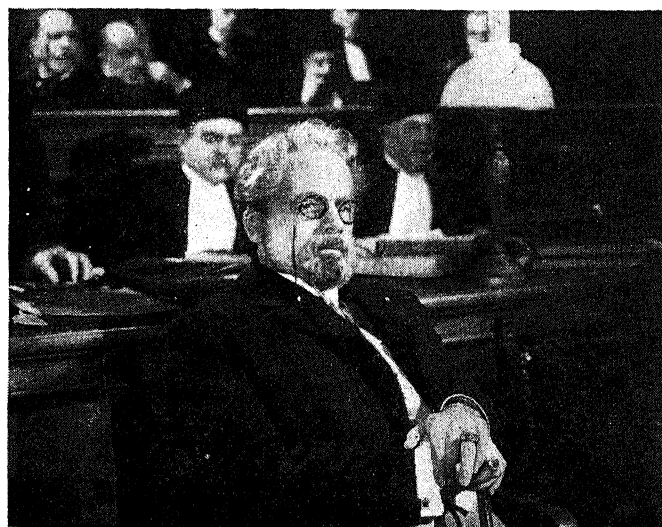
Above: Hedy Lamarr and Charles Boyer in *Algiers*. The Viennese actress made her American debut in this picture, in 1938



Circle: Luise Rainer (centre), voted the 1937 Academy winner for her performance in *The Good Earth*

Below: Clark Gable and Vivien Leigh in *Gone with the Wind*, voted the best picture of 1939 by the Academy of Motion Picture Arts and Sciences

Paul Muni in the title role of *The Life of Emile Zola*, which was awarded the 1937 Academy award as best production of that year



followed by other animated features, including two non-Disney productions, but none duplicated the success of the original.

Fantasia (1940) is describable as an illustrated concert. Music by Ludwig van Beethoven, Johann Sebastian Bach, Franz Schubert and other composers was played by the Philadelphia Symphony orchestra with Leopold Stokowski conducting, and interpreted by Disney animation.

Disney used a combination of actors and animation in *The Three Caballeros* (1944), and name players began to appear in his pictures. Metro-Goldwyn-Mayer also successfully combined live action and animation in part of *Anchors Aweigh*.

A picture memorable from the standpoint of type originality was *The Mikado*, a screen version of the Gilbert and Sullivan comic opera, which was produced in England by Herbert Wilcox. *Wilson* (produced by Darryl F. Zanuck for 20th Century-Fox) should also be considered as a landmark in film history. This story of the career of Pres. Woodrow Wilson, with emphasis on his fight for the League of Nations, excited considerable political controversy, coming as it did in the presidential election year of 1944. An expensively produced picture, *Wilson* was not financially successful but contributed greatly to the reputation of the U.S. screen.

Gone with the Wind (produced by David O. Selznick and released by Metro-Goldwyn-Mayer), based on Margaret Mitchell's best-selling novel of the U.S. Civil War, became the greatest box-office picture in history. By mid-1943, estimates of its domestic gross ran as high as \$32,000,000. Its cost of production was placed at around \$4,000,000.

Type Trends; Music.—There were a number of distinct type trends during the 1937-46 period. Naturally, World War II inspired many dramas. *Mrs. Miniver* was one of the outstanding pictures of 1942; and its feminine star, Greer Garson, won the actress award of the Academy of Motion Picture Arts and Sciences, the U.S. criterion of industry recognition of achievement. Another great war picture was *Thirty Seconds over Tokyo*.

One of the most daring pictures made was *The Grapes of Wrath* (1940), based on John Steinbeck's novel dealing with the California migration of refugees from the U.S. middle west during the period of drought and depression. The picture was extremely controversial, as was *How Green Was My Valley*, showing labour conditions among the Welsh miners. Both of these pictures were produced by 20th Century-Fox.

In 1944 *Going My Way* (Paramount) won the Academy award. Its success, and that of Bing Crosby, winner of the Academy male acting award, caused a trend in the direction of religious pictures. *The Bells of St. Mary's* (RKO), also very successful, followed. Both productions were directed by Leo McCarey.

Psychological dramas became popular in 1944. Outstanding were *Laura* (20th Century-Fox) and *Double Indemnity* (Paramount).

There was a strong movement toward better music. Columbia's *A Song to Remember*, based on the life of Frederic Chopin, was reviewed by music critics as well as motion-picture writers. The dubbing was so perfect that it was not discernible that the piano was played by José Iturbi, and not by Cornel Wilde, the star. This picture brought Wilde into popular notice. The English picture *The Seventh Veil* had music by the London Symphony orchestra. For Republic's *I've Always Loved You*, Artur Rubinstein did the recording.

The quality of music advanced in the popular field as

well as in the classical. During the latter part of the decade there was a definite trend toward the popular composers. Portrayal of the life of Jerome Kern in *Till the Clouds Roll By* (Metro-Goldwyn-Mayer) gave an opportunity to use the beautiful Kern music. Warner Brothers' *Night and Day*, depicting the career of Cole Porter, was noteworthy for its perfect dubbing, with Cary Grant, in the role of Porter, doing only the fingering and not the actual playing of the music. Also noteworthy was the same studio's *Rhapsody in Blue*, the story of George Gershwin. Many of his great tunes, including "Rhapsody in Blue" and music from *Porgy and Bess*, were effectively used.

Alexander's Ragtime Band (20th Century-Fox, 1938), featuring the work of Irving Berlin, was one of the first successful musicals. *Blue Skies* (Paramount, 1946), with Bing Crosby, while not a great picture, was musically worth presenting for its Berlin melodies. Busby Berkeley, the first director of this type of picture, relied largely on camera tricks to get his effects. While the later productions were much more elaborate and expensive, there was more feeling of intimacy in the sets than with the faraway technique employed in the earlier days of screen musical comedies. It is safe to say that no great musical on Broadway was comparable in the matters of sets and costumes with the later Hollywood offerings.

Artists.—A survey of U.S. and British production during the decade revealed among the leading artists of the screen such names as Ingrid Bergman, Bette Davis, Greer Garson, Vivien Leigh, Jennifer Jones, Joan Fontaine, Claudette Colbert, Gregory Peck, Robert Donat, Laurence Olivier, Gary Cooper, Ronald Colman, James Mason, Lionel Barrymore, Claude Rains and Humphrey Bogart.

Academy awards for the best performances by actors and actresses follow: 1937, Spencer Tracy, Luise Rainer; 1938, Spencer Tracy, Bette Davis; 1939, Robert Donat, Vivien Leigh; 1940, James Stewart, Ginger Rogers; 1941, Gary Cooper, Joan Fontaine; 1942, James Cagney, Greer Garson; 1943, Paul Lukas, Jennifer Jones; 1944, Bing Crosby, Ingrid Bergman; 1945, Ray Milland, Joan Crawford; 1946, Frederic March, Olivia de Havilland.

Academy awards for the best picture of the year were: 1937, *The Life of Emile Zola*; 1938, *You Can't Take It With You*; 1939, *Gone with the Wind*; 1940, *Rebecca*; 1941, *How Green Was My Valley*; 1942, *Mrs. Miniver*; 1943, *Casablanca*; 1944, *Going My Way*; 1945, *The Lost Weekend*; 1946, *The Best Years of Our Lives*.

The annual U.S. critics' poll of the *Film Daily* (New York) gave the following winning pictures: 1937, *The Life of Emile Zola*; 1938, *Snow White and the Seven Dwarfs*; 1939, *Goodbye, Mr. Chips*; 1940, *Rebecca*; 1941, *Gone with the Wind*; 1942, *Mrs. Miniver*; 1943, *Random Harvest*; 1944, *Going My Way*; 1945, *Wilson*; 1946, *The Lost Weekend*.

Box-office favourites of the U.S. public included Betty Grable, Lana Turner, Shirley Temple, Mickey Rooney, Judy Garland, Frank Sinatra, Van Johnson, Alan Ladd, Lauren Bacall. Margaret O'Brien made her appearance as the greatest child star since Shirley Temple, who had won the U.S. exhibitor poll of the *Motion Picture Herald* (New York) four times in succession. Miss Temple made her debut as an adult actress in 1944. Two comedians, Bud Abbott and Lou Costello, sprang into sensational popularity, and Bob Hope's name became a household word. Paramount's "Road" pictures (*Road to Morocco*, *Road to Utopia*, etc.) with Hope and Bing Crosby were outstanding successes. Danny Kaye achieved wide popularity.

Leaders in the *Motion Picture Herald's* polls of exhibitors for box-office popularity were: 1937, 1938, Shirley Temple; 1939, 1940, 1941, Mickey Rooney; 1942, Bud Abbott and Lou Costello; 1943, Betty Grable; 1944, 1945, 1946, Bing Crosby.

For artistic accomplishment as directors, the following names were outstanding: Frank Capra, Alfred Hitchcock, Preston Sturges, John Ford, Mervyn LeRoy, Robert Siodmak, Edmund Goulding, Leo McCarey, Henry King, Clarence Brown, Billy Wilder, William Wyler. The directorial awards of the Academy were: 1937, Leo McCarey; 1938, Frank Capra; 1939, Victor Fleming; 1940, 1941, John Ford; 1942, William Wyler; 1943, Michael Curtiz; 1944, Leo McCarey; 1945, Billy Wilder; 1946, William Wyler.

Documentary Films.—World War II and the "war of nerves" preceding it caused a dramatic rise in the importance of the documentary, or factual, film. Such pictures had been made before, but under troubled world conditions their scope greatly expanded. Documentaries in some instances attracted greater popular attention than that accorded films produced for entertainment purposes alone. *Sieg im Westen* (*Victory in the West*) was well designed to impress neutrals with the strength of the German armies that overran the Low Countries and France. In the United States, the Academy of Motion Picture Arts and Sciences added documentary recognition to its awards. Among such pictures thus recognized were *The Fighting Lady* (20th Century-Fox and U.S. navy) and *With the Marines at Tarawa* (U.S. marine corps). Documentaries were made both as feature-length pictures and as short subjects. Some were photographed in 16-mm. colour, then blown up to 35-mm. for theatrical exhibition. In many instances, photographic recording of the fighting by land, sea and air exposed the makers of documentaries to the same perils as the armed forces, and a number lost their lives.

Newsreels increased greatly in importance, especially in the stirring days preceding the conflict, when censorship had not yet assumed the rigidity of wartime. Theatres devoted entirely to newsreel pictures were heavily patronized.

Training and visual educational films also made noteworthy advances. Previously, educational pictures had occupied their most important positions in Germany, France and Russia. After World War II, they were given added consideration in the United States.

The possibilities of the 16-mm. film in the entertainment field also drew the attention of the U.S. industry in the postwar period. Major studios made plans to export such pictures to foreign regions where exhibition of 35-mm. films was regarded as impracticable.

Colour.—The outstanding physical development of motion pictures was the greatly increased use of colour photography, corresponding, though in a far less degree, to the change-over from silent pictures to sound in the previous decade. Unlike the sudden and complete conversion to sound, the trend to colour was gradual and fluctuating.

The first U.S. feature picture in colour, *The Gulf Between*, had been produced in Technicolor at Jacksonville, Fla., in 1917. It had been preceded in England by the Kinemacolor process. Early colour pictures were characterized by glaring hues and wide colour fringes. Hollywood experienced a colour boom in 1929-30; but the colour was not good enough or cheap enough, and the vogue ebbed. In 1932 Technicolor brought out its three-strip or three-component process, which gave a high degree of perfection. This process, requiring special cameras, was later

supplemented by the Monopack process, which permitted the use of a single original in any standard type of studio motion-picture camera. War conditions delayed a wider use of Monopack, but by 1946 about a half-dozen features had been photographed entirely by this process.

War conditions undoubtedly had a great deal to do with this development. Psychologically, colour increased the effectiveness of entertainment in regions where the world, outside the theatre was overshadowed by the tragedy of war, and lights were blacked out or dimmed. In the United States, colour was called upon to give additional production value to pictures hampered by shortages of star names and wartime set and location restrictions. Increased box-office returns allowed wider latitude for the use of a medium naturally more expensive than black-and-white photography. Colour was used to quicken the build-up of star material. Certain actresses found to be unusually attractive in colour were cast as often as possible in that medium. Such players included Maureen O'Hara, Jeanne Crain, Maria Montez and Yvonne De Carlo. Some producers came to regard colour as their greatest maker of stars.

Increased use of colour caused a minor revolution in the preparation of pictures for production. Sets and costumes had to be considered from the standpoint of colour effect, and directors came to draw upon colour qualities for characterization and the pointing up of dramatic and emotional values.

Ironically, when the break to colour came, it was impossible to satisfy the demand. In 1945 Technicolor, the dominant process, was used on 26 features in the United States, less than 10% of the total number of features produced. Postwar economic conditions delayed immediate expansion of the existing Technicolor plants. In the United States, Cinecolor and Trucolor (described as a development of Magnacolor) were increasingly used for photographing features, although not on the budget scale of Technicolor productions. In 1937 the Technicolor output of 35-mm. prints in the United States was 40,561,318 ft.; the 1945 footage was 160,471,837. The 1945 output of the English Technicolor plant was 42,482,000 ft.

In the United States, colour was first used mostly on outdoor action pictures. Then it came to be in strong demand for costume pictures and spectacles. By the close of 1946 expensive musicals in colour were the rule and those in black-and-white the exception. When colour was used on a psychological picture such as *Leave Her to Heaven*, there were critics who asserted that black-and-white would have been a more effective medium. Yet box-office estimates placed the picture as 20th Century-Fox's top-grossing production.

With colour in world demand, the German Agfa process attracted much attention in other countries. Investigators descended upon occupied Germany from England, Russia and the United States. The U.S. mission was headed by Nathan D. Golden, chief of the motion-picture division of the U.S. department of commerce. Favourable reports were brought back, and it was hoped to make the German techniques available to U.S. producers. The east-west political cleavage following the war had its repercussions even in the field of colour. In 1946 a Russian documentary in colour, *Russia on Parade*, was exhibited in the United States. The process was called "Natural Sovcolor." According to the *Motion Picture Herald*, this process was described by the picture's sponsors as "a secret known only to Soviet film producers, and represents years of experimentation." "What is omitted," the publication commented, "is that Russian soldiery occupied the Agfa plant



Above: Jennifer Jones rocketed to sudden fame as the heroine of *The Song of Bernadette*, winning the 1943 Academy of Motion Picture Arts and Sciences award for the best actress' performance of the year

Circle: Ingrid Bergman in a scene from *Casablanca* which won the Academy award as the best motion picture of 1943

Below: Katharine Hepburn and James Stewart in *The Philadelphia Story*. For his performance in the comedy, Stewart won the 1940 Academy award



Above: Spencer Tracy and Katharine Hepburn in *Woman of the Year*, named the best original screen play of 1942 by the Academy of Motion Picture Arts and Sciences

Below: Greer Garson, with Walter Pidgeon, in *Mrs. Miniver*, a film which became popularly identified as the symbol of British courage on the home front during World War II. Miss Garson was the 1942 Academy choice for the best actress of the year



at Wolfen, Germany, in mid-1945, seized the technicians and the Agfa color process, and refused to allow an American commission to visit Wolfen."

Production Costs.—The trend in U.S. production was toward fewer and more expensive pictures. U.S. feature pictures approved by the Production Code administration of the Motion Picture Association of America in 1945 numbered 358, the lowest figure since the early days of the industry (in 1937 the number was 587). Hollywood production costs for 1945 were estimated at \$401,577,800 (*Film Daily*); the estimate for 1937 was \$152,500,000. War conditions contributed heavily to the trend. Stemming from the "bargain offerings" of the depression period, the double feature program had developed strongly. This resulted in the Hollywood studios' gearing their production to "A" pictures, to head dual bills, and "B" pictures, to supplement them. During the war and its aftermath, increasing production difficulties and sharply rising costs militated against the making of "B" pictures.

One of the great problems of motion-picture production, especially in countries where the output was large, was finding suitable subject matter for pictures. Reports of the Production Code administration showed that, for the U.S. industry, the basic sources of screen material altered their status very little during the decade. In 1945 original stories amounted to 64.5% of the total; in 1937, 64.3%; novels, 1945, 15.2%; 1937, 16.8%; stage plays, 1945, 6.7%; 1937, 6.4%.

In the early days of the industry, a million-dollar production evoked all the superlatives in the dictionary of exploitation. In 1946, in the major studios of the United States, budgets in the millions were no longer subjects for a comment. The fabulous salaries paid to the top people of the industry, coupled with the skyrocketing of labour and material costs, would have meant heavy budgets in any event. Also, pictures generally were planned on more ambitious scales; and prices paid for literary properties, such as novels and plays, rose to record heights. And to all these contributory elements was added the increased artistry of production. Once directors had prided themselves on the number of scenes they could shoot in a day. In 1946 stepped-up artistic rivalry caused more painstaking, and therefore slower, filming. The result was finer and more expensive pictures.

The success of *Gone with the Wind*, which ran for more than three hours, materially affected the trend toward increasing length of high-budgeted pictures. Exhibitors began to complain that pictures were too long, and many reviewers corroborated their testimony. "If the picture had been shorter, it would have been better," became a common critical tag.

Outstandingly illustrative of the heavy-budget trend was *Duel in the Sun*. It was estimated that, including exploitation, it had cost David O. Selznick \$9,000,000 up to October 1946. Darryl F. Zanuck spent \$4,000,000 on *The Razor's Edge*, considered one of the finest pictures, with the possible exception of *Wilson*, ever made by 20th Century-Fox.

U.S. audiences became accustomed to the more expensive brand of picture, and "war money" allowed them to gratify their tastes. According to the *Film Daily*, the average price of admission rose from 23 cents in 1937 to 30.5 cents (exclusive of an average 6.4-cents tax) in 1945. Estimates on weekly attendance at U.S. film theatres in 1945 ran as high as 98,000,000 (*Motion Picture Almanac*); 1937 estimate, 85,000,000. Estimates on total receipts of U.S.

theatres (excluding admission taxes) ran from \$1,300,000,000 (*Motion Picture Almanac*) to \$1,500,000,000 (*Film Daily*) in 1945 (1937 estimate, \$1,052,480,000, *Film Daily*).

In 1946 *Variety* (New York) estimated that, over the entire history of the U.S. motion-picture industry, 33 Hollywood productions had grossed, or gave promise of grossing, a minimum of \$4,000,000 in domestic rentals. Of these, 16, or nearly half, belonged to the lush 1945-46 period.

The immediate postwar period found the U.S. studios generally in the best financial condition in their history. The box-office boom took care of both increased production costs and heavy taxes. But industry leaders warned of the possibility of attendance decline, with resulting enforced retrenchment. Studios producing animated pictures already felt the pinch of rising costs.

Capital investment in the U.S. film industry was placed at \$2,050,000,000 (U.S. department of commerce, *Motion Picture Herald*), including theatres \$1,900,000,000; studios \$125,000,000; distribution \$25,000,000. It was estimated that about 200,000 persons were employed on an average in all branches of the industry, with payroll estimates running as high as nearly \$500,000,000 yearly (*Film Daily*).

In the immediate postwar period, in both the production and theatrical fields, there was need for physical improvement and new construction, which largely had to wait on economic conditions.

Hollywood had attained its status as the world motion-picture capital by drawing heavily upon foreign talent. For years, outstanding achievement by actors, directors, etc., had been equivalent to a passport to Hollywood. The U.S. film industry offered foreign artists larger rewards and greater opportunities than were available to them at home. This condition tended to drain other countries of their best talent and contributed in no small degree to U.S. supremacy in world markets. The coming of sound naturally tended to restrict the influx of players from non-English-speaking lands, and the rise of nationalistic ideologies further militated against the free movement of talent. After World War II the free movement of talent between the United States and the various parts of the British empire was resumed, and a number of British stars and directors apportioned their time between England and the United States.

War Contributions.—While the various countries involved in World War II made what use they could of their motion-picture industries, naturally the outstanding contribution was made by that of the United States, because of its exceptional facilities. The U.S. industry's over-all organization for war was the War Activities committee. Through its Theatres division, more than 16,000 film houses pledged themselves to exhibit government information films, and the theatres also participated prominently in the sale of war bonds, raising funds for patriotic purposes, etc. The War Activities committee donated to the army for overseas distribution 43,306, 16-mm. prints of feature pictures and 33,326 prints of short subjects. Audiences viewing these pictures were estimated at 750,000,000.

Three days after the Japanese attack on Pearl Harbor, the Hollywood Victory committee was organized. Its task was to co-ordinate the morale activities of the industry. Under its auspices, players of both sexes, including outstanding stars, entertained servicemen both at home and overseas. They also went on tours to sell war bonds, made radio broadcasts for the war effort and appeared in films produced for war purposes. The Hollywood canteen, operated by industry celebrities, entertained more than 3,000,000 servicemen and -women.

Many of the stars visited the remote war fronts where the fighting was heaviest. Bob Hope, Bing Crosby, Joe E. Brown, Frances Langford, Kay Francis, Carole Landis, Martha Raye, Betty Hutton and Paulette Goddard were among the scores who distinguished themselves. Carole Lombard lost her life early in the war in a plane crash on war bond service.

Some idea of the scope of the Hollywood Victory's committee's war service may be gained from the following statistics: 56,037 free appearances by 4,147 personalities; 122 overseas tours; 406 hospital and camp tours; 214 personalities on war-bond broadcasts and radio transcriptions; 2,438 entertainment transcriptions for overseas transmission by Armed Forces Radio service; 38 films made with top stars; 390 broadcasts and transcriptions and 461 personal appearances for war relief and charity.

The U.S. industry turned out about 4,000 war-training films for the government, at cost. As needed, physical facilities of studios were placed at the disposal of the government without charge. Other productions included documentary films, government trailers and inter-American relations films. Stars made personal appearances in Latin-American countries in furtherance of their government's good-neighbour policy.

Many actors, directors, executives, writers and others, entered the armed forces. The War Activities committee estimated that about 7,000 men—one-third of those commonly employed in the motion-picture industry in Hollywood—were in the services. The knowledge of film technicians was found to be invaluable in modern warfare. Among the industry's outstanding technical contributions were such specialists as cameramen, camouflage experts, sound department technicians skilled in radio work and aircraft detection, laboratory technicians, precision machinists and electrical experts.

Aside from the depletion of manpower, the U.S. industry felt the war in many ways. Raw film stock was rationed by the government; set construction was limited; there were shortages of vital supplies and materials and location shooting was curtailed because of safety restrictions, rationing of gasoline and tires, etc. The situation of the British industry was worse, with studio space requisitioned by the government for war purposes. Yet technical ingenuity made a splendid showing in grappling with war hindrances.

Censorship and Politics.—Time had been, at least in the democratic countries, when studios could consider their production program from the standpoint of potential entertainment value alone. In English-speaking countries generally, censorship concerned itself with questions of morals and good taste. As the world moved toward war, other matters had to be pondered, especially from the standpoint of dwindling foreign markets. Under totalitarian regimes, the line already had been drawn against importation of pictures reflecting upon national ideologies or presenting attractively other ways of life. *

Nationalistic feelings rose in intensity. Nations, especially minor powers, became fearful of permitting the exhibition of pictures which might give diplomatic offense to mighty neighbours. Even when censorship was not official, riots could be stirred up by one group of sympathizers or another. When Charles Chaplin's *The Great Dictator*, burlesquing Adolf Hitler and Benito Mussolini, was released after the outbreak of the war in Europe, its exhibition became a matter of contention in a number of South American countries. It was charged that axis diplomats in Latin America used their official influence to ban pictures which they regarded as inimical.

The U.S. motion-picture industry early took a stand against nazism and its affiliated philosophies. This position aroused the antagonism of the so-called noninterventionist elements. In the heat of the bitter political debate that preceded the U.S. entry into the war, the latter forces charged that the industry was seeking to involve the nation in the conflict. Though the industry's attitude very much resembled that of Pres. Franklin D. Roosevelt's, a number of its leading executives were summoned before a senate subcommittee in 1941 for questioning on the subject of war mongering. Maintaining their abhorrence of Hitlerism, they denied the existence of any conspiracy to produce propaganda for war and asserted as a public service the right to make pictures concerning current events.

In one form or another, political pressure with the avowed or masked purpose of oppressive censorship, remained to plague the industry. Permanent government censorship, dreaded above all else, was advocated in some form or another. During the war, government censorship was limited to licensing of films for export.

In the postwar period, the U.S. industry underwent attack on charges, emanating prominently from the house of representatives Committee on Un-American Activities, that some of its leading figures were communists or "fellow-travelers." The result of continued agitation was to make many motion-picture celebrities increasingly political minded. Stars, producers, directors, etc., were in the forefront of the presidential campaign of 1944 on both the Democratic and Republican sides, and this political interest continued.

After the war, the industry breathed more freely insofar as the threat of official censorship was concerned. Then in 1946 it found itself involved in a censorship controversy of an internal nature. The Production Code administration, the self-regulatory organization of the industry, withdrew its official seal from Howard Hughes's *The Outlaw*, on the ground that advertisements of the picture had not been submitted for approval. Hughes sought redress in the courts. *The Outlaw* scored sensationally at the box office, though it ran into local censorship troubles in a number of communities.

The Independents.—Motion-picture production in the United States tended to decentralize. Independent producing companies, making their own products and releasing through the distribution set-ups of larger studios, became more numerous, especially in 1944 and thereafter. In the ranks of the independents were found stars, directors, writers, executives and others. Among the reasons given for this development were soaring box-office returns, ease of obtaining capital, tax advantages and greater freedom of action. Among those who entered the ranks of the independents were Frank Capra, William Wyler, Hedy Lamarr, Hunt Stromberg, Rosalind Russell, Dudley Nichols, Joan Fontaine, William Dozier, Hal Wallis, Joan Bennett, Walter Wanger, Fritz Lang, Gary Cooper, Ginger Rogers, Charles Einfeld and Bing Crosby. In 1946, International, headed by William Goetz and Leo Spitz, merged with Universal, the resulting organization being known as Universal-International.

World Market.—In his report as president of the Motion Picture Association of America (dated March 25, 1946), Eric Johnston said: "A world market for American motion pictures spells the difference between profit and loss for the American industry. I am told that at least one third of the negative cost of motion pictures produced in this country must be recovered from foreign revenue. Sub-

stantial reduction in this revenue will either restrict expenditures for production to the artistic detriment of the product or throw heavier burdens on American exhibitors and consumers."

According to the Motion Picture Association of America, the loss of axis-dominated territories in war years "was largely offset by the extraordinary demand for motion picture entertainment in territory which still remained open. For example, attendance at British motion picture theatres in 1944 was practically double pre-war average." It was estimated that U.S. sales abroad in 1946 would realize about \$120,000,000.

For years before the war, while a nominal tariff was the only requirement for entry of foreign films into the United States, other countries generally had increased their restrictions. Reasons ranged anywhere from the national honour to the national economy—ideological considerations, desire for increased revenues, fostering of domestic production. To cope with the British quota law (*see below*), U.S. companies produced pictures in England. Naturally, the U.S. industry was most affected by such restrictions. It was estimated by *Film Daily* that in 1937 the percentage of screen time in all foreign markets for U.S. pictures was 70%.

Among postwar obstacles in various countries were listed (Motion Picture Association of America) excessive import duties, internal tax measures assessed against foreign films after importation, quota laws requiring a certain percentage of theatre playing time for native pictures, discriminatory theatre taxes upon exhibition of foreign films, government monopolies, theatre combines having the effect of monopolies and government censorship. In the last category it was stated that "in countries within the sphere of Soviet influence motion pictures which present other forms of government in a favorable light are rejected." Also, there were still occasional rejections based on supposed derogatory references to a country. And, hard as it was to get U.S. pictures into many countries, it was still harder to get the dollars for them out. In 1945 the Motion Picture Export association was organized to deal with foreign problems of the U.S. industry.

One of the factors in national restrictions on foreign motion pictures was the increasing realization that trade follows the film, especially with reference to the U.S. product. It was felt that, in the guise of entertainment, U.S. motion pictures indirectly advertised U.S. goods and services abroad. This situation had various ramifications. After the war, it was believed in some U.S. and British quarters that the showing of certain types of pictures in regions which had suffered most from the conflict would have an adverse effect on audiences. It was reasoned that people sunk in economic misery would view with resentment films showing, by their standards, characters luxuriously fed and clothed. To such audiences, according to this view, musical comedies, which made no pretense of reality, and other escapist fare would be most acceptable.

One of the foreign problems of the U.S. industry was the accumulation of 5 years' product which had not been permitted to be shown in 30 axis-controlled countries during the war. It was felt that any general "dumping" of these pictures would have a disastrous effect, even if permitted. There was no question of the desire of the populace in such countries to view U.S. films. It was reported that in a number of regions not yet reopened to importation, prewar U.S. pictures were extremely popular.

Though having an overwhelming lead in the produc-

tion of top features, the United States, in peace times, did not make nearly so many pictures as the rest of the world. In the 1930s Japan was producing from 450 to 550 pictures annually. Europe produced 721 features in 1936. About 1,300 features were made outside the United States in 1939, in which year the Production Code administration listed 527 U.S.-produced features.

Administration and Labour.—In 1945 the U.S. motion picture industry came under new leadership in both the Motion Picture Producers and Distributors of America (which later became the Motion Picture Association of America) and the Society of Independent Motion Picture Producers. Eric Johnston, president of the U.S. chamber of commerce, became president of the first-named organization, and Donald M. Nelson, who had served as chairman of the War Production board, of the latter. Johnston succeeded Will H. Hays, whose incumbency since the formation of the organization in 1922 had given it the popular designation of the Hays office. Byron Price, who had been in charge of government censorship during the war, became vice-president in charge of Hollywood activities of the Motion Picture association.

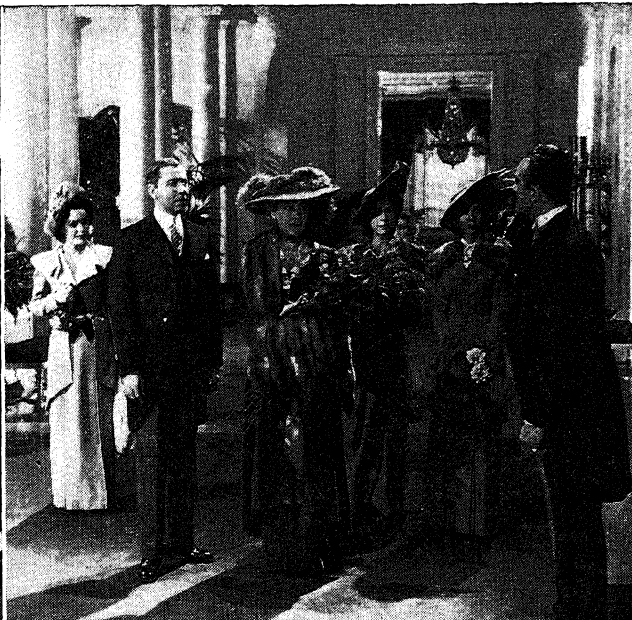
Labour conditions in the U.S. industry were matters of concern at various times during the 1937-46 decade. The beginning of the period saw the industry thoroughly organized, from stars to set workers. The most serious labour difficulties had their roots in jurisdictional disputes rather than in straight employer-employee disagreements. The workers in the industry, with the exception of such groups as extra players, were regarded as among the best paid in the United States. In 1941 George M. Browne, president of the International Alliance of Theatrical Stage Employees (I.A.T.S.E.), and William Bioff, its Pacific coast representative, were convicted in federal court in New York on charges of extorting \$550,000 from 4 major studios under threats of strikes. Browne's sentence was 8 years, Bioff's 10 years, each being fined \$20,000. Both were later paroled.

The industry's gravest labour troubles grew out of conflict between the I.A.T.S.E. and the Conference of Studio Unions. In March 1945 the C.S.U. struck, after a controversy over the affiliation of a small number of set decorators, the I.A.T.S.E. endeavouring to keep the studios operating. The strike lasted for eight months with the C.S.U. finally winning its point in the settlement. However, the labour situation remained uneasy, and the fall of 1946 found the C.S.U. again picketing the studios. In neither strike was production stopped, but it was made more difficult and expensive. The decrease in the number of pictures turned out in 1945 was attributed in part to strike conditions. Both the I.A.T.S.E. and the C.S.U. (with the exception of one union) were affiliated with the American Federation of Labor.

Antitrust Suit.—In the United States, there had for years been exhibitor complaints against the practice of "block booking" and "blind selling" by which the entire yearly output of studios was contracted for by theatres in advance. The result of government antimonopoly action was the so-called "consent decree" in 1940. Most of the larger companies agreed to sell their pictures in maximum blocks of five, after regional showings to exhibitors. After the expiration of the consent decree, the government antitrust action against eight companies went to trial in U.S. district court in New York in 1945. The government contended that theatre control (charged against five companies) and various asserted trade practices were monopolistic in nature. The announcement of the court findings, given in 1946, did not call for general divorcement of thea-



Above: Bing Crosby, Barry Fitzgerald and Frank McHugh in *Going My Way*, which won seven separate awards of the Academy of Motion Picture Arts and Sciences in 1944



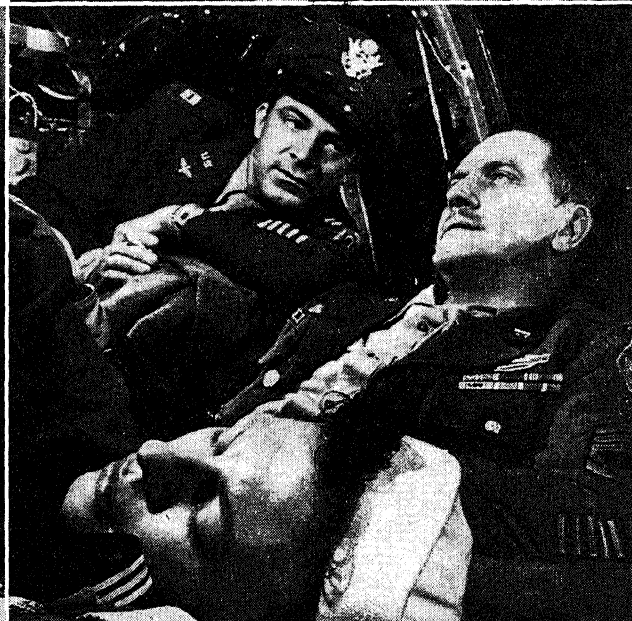
Upper right: Alexander Knox (second left) in the title role of *Wilson*, which won the 1944 Academy awards for the best original screen play, sound recording, art direction of a colour film, film editing and cinematography in a colour film

Right: Ray Milland as the drunkard in *The Lost Weekend*, chosen best picture of 1945. The Academy of Motion Picture Arts and Sciences selected him as the best actor of 1945. Other honours awarded the picture were those for best direction, by Billy Wilder, and for the best-written screen play



Below, right: Dana Andrews, Frederic March and Harold Russell, as the three homecoming veterans in *The Best Years of Our Lives* which won six of the 1946 Academy awards including the award for the best picture of the year

Below: James Dunn (seated right) with members in the cast of *A Tree Grows in Brooklyn*, which won for him the Academy award for the best supporting actor of 1945. Peggy Ann Garner (foreground) was given a special award as the outstanding child actress of the year



tres but prescribed new trade practices in the method of distributing pictures. Both sides were dissatisfied with various provisions, and final determination was still awaited.
(L. O. P.)

The British Cinema

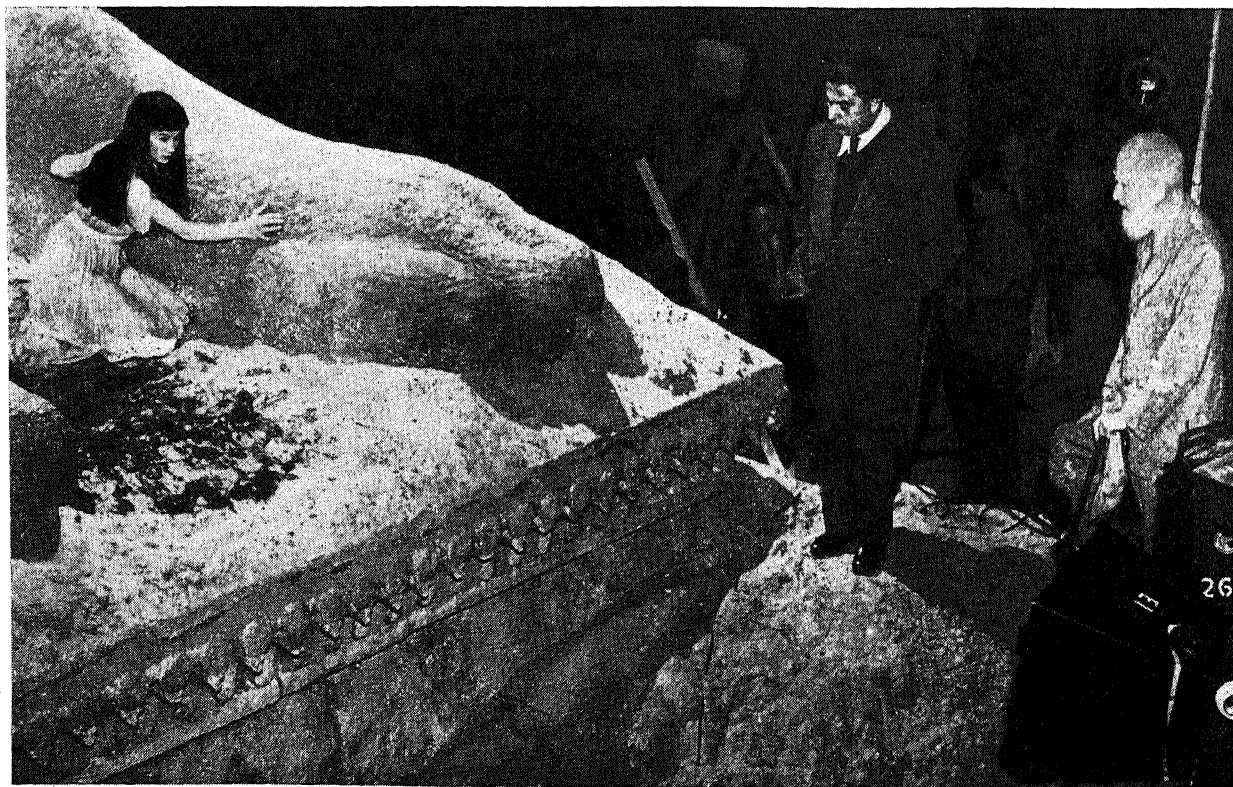
Britain's 4,750 cinemas, mostly showing double-feature programs, required about 500-600 feature films a year to keep their entertainment constantly changing. Ever since World War I, exhibition demands had greatly exceeded the supply of British-made films, so that during the 1920s programs were almost entirely made up of U.S. films. In 1927 a quota act was introduced making it legally obligatory for British exhibitors to show a growing percentage of British-made films. This resulted in only a few British features of good quality; most of the product was cheaply made second-grade features to fulfil the quota. In 1938, however, the act was renewed; the quota which had begun originally at 5% was fixed at 12½% for 1938, rising to 20% in 1942 and 25% in 1947. This quota was revised during World War II and kept stable at 15%. Later it was raised to 17½% for 1946 and 22½% for 1947. The new quota act also aimed at eliminating the cheap and shoddy film by laying down a cost clause of £21,000 minimum to be spent on British labour in the course of production of a film qualifying for quota. Nevertheless, the three years prior to the war were years of slump in British film production; among the few notable feature films made were Leslie Howard's *Pygmalion*, Michael Powell's *The Edge of the World*, Carol Reed's *Bank Holiday* and *The Stars Look Down*, Victor Saville's *Goodbye Mr. Chips* and King Vidor's *The Citadel*. The two last-named films were sponsored by U.S. companies working in Britain.

George Bernard Shaw (right) and Director Gabriel Pascal on the set of Shaw's *Caesar and Cleopatra* where Vivien Leigh is shown rehearsing a scene at the foot of the sphinx. Filmed in England in Technicolor, the picture was released in the U.S. in 1946

With the cinema as the largest single entertainment medium in Britain for mass audiences, it was obvious that the British film should play its part during the war years and not be almost entirely eliminated from the screen as it had been during World War I. The few notable films made in previous years had shown that fine cinema could be produced in Britain provided that men and women devoted to the medium were concerned in the production. Nevertheless, when the board of trade announced that the quota in favour of the British product was to be maintained, producers were faced with unenviable problems to solve. Barely one-third of the technicians were left. Studios were requisitioned by the government either for official production (service training films, etc.) or for storage depots. In 1939 there were 65 sound stages in production; in 1942 there were only 30. Film stock went into short supply. Raw materials for sets and costumes became matters over which to haggle with government departments. The craftsmen required to keep sets built in a studio were the very men most needed outside in bombed and devastated cities.

But there was another side to the picture. The difficulties, and the times which caused them, were a challenge to the producers, artists and technicians left on the set. A new serious purpose came into the industry to meet the demand of the audiences of the period for authenticity and sincerity. Film after film was made which aimed at re-creating the atmosphere of those intense years not merely as the serviceman and servicewoman saw them, but as the civilian experienced them at home. These films constituted a revolution in British feature-film production. For the first time British people met themselves on the screen and met themselves in films as imaginative and sympathetic to the national character as the best French films had been during the 1930s. The increasing British audiences recognized this new quality, and the British product became good box office.

Among the war films should be remembered Noel Cow-



ard's and David Lean's naval film, *In Which We Serve* (1942); Frank Launder's and Sidney Gilliat's study of women in industry, *Millions Like Us* (1943); Thorold Dickinson's army security film, *Next of Kin* (1942); Leslie Howard's film about R. J. Mitchell, designer of the "Spitfire," *First of the Few* (1942) and his film about service-women, *The Gentle Sex* (1943); Charles Frend's picture of merchant seamen, *San Demetrio, London* (1943); Anthony Asquith's film of submarine warfare, *We Dive at Dawn* (1943), and Harry Watt's film of a tank unit isolated in the desert, *Nine Men* (1943). Later war films, concentrating increasingly on personal problems rather than war action, were *Waterloo Road* (Gilliat and Launder, 1945), *The Way Ahead* (Carol Reed, 1944), *The Way to the Stars* (Anthony Asquith, 1945) and *Journey Together* (John Boulting, 1945). The last named was remarkable since it was a feature film sponsored and made by the royal air force. Other officially sponsored films of feature length, but close to the documentary style in the treatment of their narratives, included *Target for Tonight* (R.A.F.), *Close Quarters* (the submarine service) and *Western Approaches* (the Crown Film unit's feature film in Technicolor on the merchant service).

Not all the more distinguished wartime product was about the war itself. The melodrama *Gaslight* (1940) and *The Prime Minister* (1941), a film about Benjamin Disraeli, were made by Thorold Dickinson. *Kipps* (Carol Reed, 1941) was an excellent comedy from H. G. Wells's novel. John Baxter's *Love on the Dole* was a fine working-class film. Noel Coward and David Lean made *This Happy Breed* in 1944 about a London suburban family. These and some other films consolidated or added to the reputations of such directors as Thorold Dickinson, Leslie Howard, Anthony Asquith, Michael Powell, Charles Frend, Frank Launder, Sidney Gilliat, John Baxter, Carol Reed, Roy and John Boulting and David Lean.

Meanwhile the financial background of the British film industry was undergoing considerable modification. Britain had about 4,750 cinemas of which approximately 2,000 were first-grade theatres. Of these 2,000, more than 1,100 were owned by three combines, Odeon, Gaumont-British and Associated British Cinemas. The last was financially linked with Warner Brothers of the U.S.A. By 1941 the two former came under the control of the Rank organization, which also had acquired about 50% of the studio space of the country. This placed Arthur Rank as the undisputed financial controller of the major part of the British film industry, rivalled only by Associated British Cinemas in exhibition. London, the shop window for the film industry, became the centre of distribution for all films; and two-thirds of the first-grade cinemas in the London release area were controlled by the three circuits. To secure even reasonable financial returns, all films had to be booked and shown by one or another of the three circuits. There was, therefore, virtually no feature-film production in Britain without previous distribution agreements with one of the circuits. British first-feature films cost normally between £125,000 and £312,500 to produce; with circuit booking they could earn more than £375,000 on the home market alone. Without circuit booking their earnings would be small and indeterminate. Rank had concluded deals with U.S. distribution companies for the exhibition of his product overseas, and was to acquire chains of cinemas abroad, particularly in the British commonwealth.

By virtue of owning more than half the studio space of the country, Arthur Rank had become the major producer of films in Britain, distributing them automatically through his circuit houses. He grouped within his organ-

ization a number of so-called independent companies who depended on him for studio space but had a relatively free hand in the design of the films they wished to make. The results were the very differing styles exhibited by British films as made by the small companies like Cineguild, Archers Productions, Charter Films, Pascal Productions, Individual Pictures and Rank's directly controlled companies, Gainsborough and Two Cities, and the genuinely independent studios like Ealing and Riverside, whose product was distributed by the Rank organization.

A great deal was said outside and inside the industry for and against the monopolistic encroachments of the Rank organization. It was the subject of a government inquiry, the results of which were published in 1944 by the board of trade under the title *Tendencies to Monopoly in the British Film Industry*. Among its recommendations was an appeal for government protection for the independent film producer. The board of trade was too pre-occupied with major postwar legislation to give much attention to consideration of the film industry, though it was as anxious as the industry itself to expand the overseas market for British films. Expenditure by Britain on renting U.S. films between Sept. 1939 and Jan. 1946 was stated by the chancellor of the exchequer to have been £82,600,000.

With the return of studio space to the industry by the government (completed during 1946) and the demobilization of servicemen who previously had been studio technicians, it was hoped that the number of feature films produced would rise rapidly. The average productivity during the war years had been around 60 features annually. After the war a number of fine films showed that peacetime production did not lag behind wartime artistic standards; these included *The Seventh Veil*, *Dead of Night*, *The Captive Heart*, *The Rake's Progress*, *Blithe Spirit*, *Henry V*, *I Know Where I'm Going*, *A Matter of Life and Death*, *Brief Encounter*, *The Overlanders* and *Men of Two Worlds*. There was also the ambitious *Caesar and Cleopatra*.

During the war the documentary film played an important part in the public information services. Government films were distributed freely and shown regularly in the cinemas, feature-length official films, like *Target for Tonight* and *Western Approaches*, were rented by exhibitors and the nontheatrical audience attending programs made up entirely of documentary shorts rose to 10,000,000 a year, mostly attending road shows given by government mobile units in factories, schools, village halls and to audiences organized by the many voluntary bodies in Britain and by the civil defense workers. These shows, consistently popular and demanded by the public beyond the capacity of operators and equipment to meet the need, were a revolution in public education. They were to remain a permanent part of the official educational provision for children and adults. Films were commissioned by the ministry of information and the services and were made mostly by independent documentary units. The chief services also had their own film production units; the prewar official General Post Office (G.P.O.) unit became the enlarged Crown Film unit which made notable war documentaries. Hundreds of films were produced on service training, agriculture, engineering, health, domestic problems, citizenship and information about Britain and other nations. Many films were imported from the commonwealth and Allied countries. The British council commissioned a number of films about Britain, its indus-

tries, science and medicines for showing overseas; and the government Colonial Film unit specialized on a small scale with the development of documentary as part of the educational system of the African native. Documentary, ten years old when war broke out and little known by the greater public, came into its own. Outstanding films included the war record series from *Desert Victory* to *The True Glory*, films of social problems like *The World of Plenty* and medical studies like *Surgery in Chest Disease*.

British Commonwealth.—The greatest activity in film production in the British commonwealth was John Grierson's wartime expansion of documentary in Canada. This was parallel to the British expansion. Distribution of Canadian documentary was on an international scale both theatrically and nontheatrically, especially in Britain and the United States. Nontheatrical audiences in Canada included 500,000 factory workers and farmers meeting monthly. The National Film board annual production rate reached more than 200 films, the best known of which was the *World in Action* series. Film subjects included agriculture, education, art, health, history, geography and industry as well as war subjects. Special discussion films had been prepared to give a lead to discussion groups primarily organized by the trade unions. Grierson left the Canadian Film board in 1945 to found a documentary research and production organization based in America to serve world audiences with films on world problems. It should be remembered that Michael Powell's important film *49th Parallel* was made in Canada in 1940.

Film production in South Africa was practically negligible, and only a very small number of feature films were made before the war in Australia. Both countries supplied a few documentaries on their lives and industries during the war. Thorold Dickinson's outstanding film in Technicolor, *Men of Two Worlds*, was prepared in Africa (Tanganyika Territory), though much of it had to be reconstructed and produced at the Denham studios. It was an authentic study of African problems. Similarly, Harry Watt spent two years in Australia making *The Overlanders* and acting as adviser to the Australian government on film production.

India had a large film industry capable of making about 200 feature films a year, and a number of units based on Bombay made educational and documentary films. The feature films were shown in some 1,400 theatres which showed Indian films only. English-speaking films were shown in about 230 theatres. The Indian films were noted for their length and their love of extensive dialogue, and it was rare for them to reach a high level of production value, as, for example, in the case of *The Unexpected*, produced in Bombay by Shantaram, a social film on a Hindu girl's successful resistance against the rigid conventions of Hindu marriage custom.

Continental European Films

The fateful ten years from 1937 to 1946, which saw the rise and fall of Hitler's new order on the European continent, had also a strong impact upon the European cinema. Although no major evolution took place in film technique, the more significant changes of a psychological nature became effective in the social and artistic spheres.

The German film industry, at the time of Hitler's rise, was among the leading in the world for quality, and as to quantity, second only to Hollywood. It was singled out by the nazis to become their foremost propaganda instrument. This process, which was only gradually driven forward

with the growing self-assertion of the nazi regime, was characterized by two traits: one, the application of the nazis' totalitarian and racial principles to the film industry and its personnel, the artistic and technical as well as the administrative; the other was the reorganization of the industry under strict state control, with a view to securing a production completely subjected to their propaganda and psychological requirements. The former had already been effected by 1937, and many of the personalities responsible for the high international reputation of the German film (e.g., Eric Pommer, the producer, and Fritz Lang, the director) had chosen to carry on their vocations in Hollywood or London, Paris, Prague or Vienna.

The phase of artistic leadership of the German cinema had virtually ended by 1937. One and two years later respectively, the studios of Vienna and Prague were also fallen bastions.

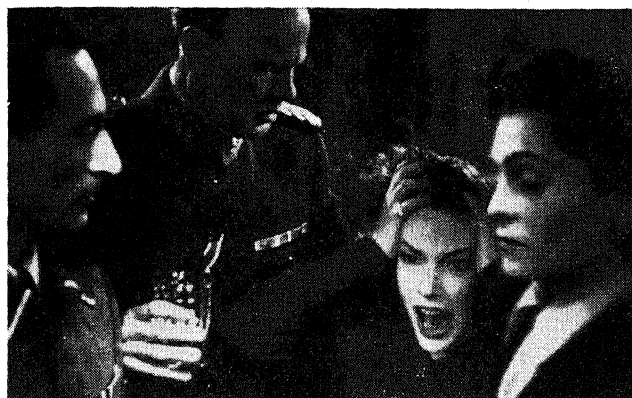
Up till then, Czechoslovakia as well as Austria had had a flourishing production of its own, the best examples of which found world-wide distribution. Those Czech film technicians, writers and artists who, after the invasion of their country, had been able to escape, carried on in exile. Czech production units were formed both in the U.S.A. and Britain; the latter unit, apart from documentaries, turned out two major films, one on Lidice, the other a *Schwejk* subject; co-operation from British film units was secured. Refugees from other invaded countries did the same, and Britain saw Polish, Dutch, Norwegian, Free French and Belgian film units operating during the war. This remarkable development indicated the growing awareness of the governments that film production had become an integral part of national existence, even in exile.

In Germany, the first stage of the nazi cinema lasted until approximately 1939. The bulk of German production consisted of the average type of entertainment film, with a distinct sprinkling of major subjects promoting the nazi myth: films glorifying the political gangsterism of the *Frei Korps* in the early years of the Weimar republic, or nazi heroes like Horst Wessel or the Hitler Youth movement (*Hitlerjunge Quex*) or the German minorities in other countries, the fifth columns of the future.

The second, more-outspoken phase of the nazi cinema began in 1939, with Hitler's power so stabilized that he felt ready for actual war. Film financing, production and distribution were completely concentrated and firmly activated for psychological warfare both at home and in other countries. A few producing companies centred in Berlin, Vienna, Munich and Prague were left. Importation of foreign films came almost to a standstill, while in the production schedules the number of escapist films in the Viennese operetta style was reduced. Four types of production could now be clearly discerned: (1) Semidocumentaries, such as *Baptism of Fire* presenting the Polish campaign of 1939, with the purpose of impressing upon other nations Germany's invincible power. (2) Historical films about Prince Otto von Bismarck or, once more, Frederick the Great, giving the nazi version of history. To this category could be added those anti-Semitic films of which *Jew Süss* was an outstanding example of fallaciousness. (3) Topical entertainment films with insidious propaganda directed against the countries at war with Germany; examples were *Ohm Krüger*, with the Boer War as background, a violent anti-British film, or *G.P.U.*, which attributed gestapo methods to the soviet regime. (4) Biographical films on outstanding Nordic personalities of the past—such as Bach, the composer; A. F. Menzel and Rembrandt van Rijn, the painters; Robert Koch, the bacteriologist—interpreted according to the nazi creed. After the collapse of the third reich,



Above: Fernand Ledoux (left) and Georges Rollin in a scene from the French comedy *It Happened at the Inn*



Above: Dramatic scene from *Open City*, an Italian film notable for its realism; the National Film Board of Review of Motion Pictures voted it the best foreign language picture of 1946

Below: Laurence Olivier as Henry V in the British film production of Shakespeare's historical play, which was selected as the best picture of 1946 by the National Film Board



Above: Detail of a mob scene from *Ivan the Terrible*, film pageant in three parts produced by Sergei Eisenstein, outstanding soviet film director, and shown in Russia during 1945

Below: Two of the principals in the Swiss motion picture *The Last Chance*, an account of a small band of refugees fleeing nazi persecution, which was chosen one of the ten best films of 1945 by the National Board of Review



attempts to revive German film production were made during 1946 under Allied supervision. A Russian licence was granted to Deutsche Film Aktiengesellschaft (D.E.F.A.), which had begun producing in Berlin; so also had Studio 1945 under a British licence; for the U.S. authorities Eric Pommer was about to reorganize production in Berlin and Munich.

The principles outlined above were not confined to Germany, but applied to all the countries under axis influence. The French cinema had by 1937 entered a very promising stage. It is sufficient to point out the poet René Clair, the psychologist Jacques Feyder, the painter Jean Renoir, the technician Julien Duvivier, the physician Marcel Carné and the martyr Jean Vigo, who were pioneers of art in the world of the film. When war and occupation clamped down on the French studios, few directors and artists of reputation were ready to collaborate. Some went on working under the strain of avoiding any political and ideological concessions; films such as *Goupi*, *Mains rouges*, *Les visiteurs du soir* and *L'éternel retour* were the outcome. Other cineastes managed to escape and carry on their work in other countries. A good many went underground, with Pierre Blanchard as their leader. The film *Pontcarral* (1942) even achieved a certain amount of subtle antinazi propaganda, which went undetected by the Germans. After the liberation, the French cinema could again draw on its inexhaustible reservoirs of talent. Jacques Becker, Robert Bresson, Jean Cocteau, Claude Autant-Lara, Henri Calef, René Clément and others were again carrying on the tradition of high artistic standards which so distinguished the French cinema.

While the French film inevitably had to suffer through the course of the war, other film-producing countries profited by it. Italian film production was artificially inflated by means of large financial support from the fascist regime, and quality by no means kept pace with quantity. The same applied to the then axis satellite Hungary. The end of the regime in Italy, however, gave rise to a fresh production effort in a very different spirit. The Italian film was a growing factor, and its greatest achievement *Rome—An Open City* (1945-46) by Roberto Rossellini, an outstanding example.

Different again was the effect upon the neutral countries. Countries like Sweden and Switzerland, more or less cut off from the outside world and with German propaganda films forced upon them, were induced by this situation to increase and improve their own production effort. In such a small country as Switzerland, existing conditions were bound to limit production, but among the films made, several of them based on classic works by Gottfried Keller, two pictures stood out, both directed by Leopold Lindtberg: *Marie-Louise* (1944) and *The Last Chance* (1945). Sweden, on the other hand, had an old tradition of film making dating from the silent days. Its studios, while not upholding the artistic standards of Mauritz Stiller and Victor Sjöström, were turning out an annual average of 30-50 features, thus becoming one of the major European production centres. The most outstanding achievements during the war were *Himlaspalet* (1942), with a religious background, by young Alf Sjöberg and *Anna Lans* (1943). Sweden's best film of 1945 was *Blood and Fire*. While themes of psychological character, such as *Frenzy* and *Waiting-Room of Death*, were the specialty of the ambitious young school of Swedish cineastes, a good many light comedies, too, were being made and Niels Poppe, Sweden's outstanding comedian, was hailed as the Swedish Chaplin.

The other Scandinavian countries, of which Denmark especially had a production of long tradition though small in output, were less fortunate. Film activities in Norway and Denmark, naturally, almost ceased under occupation. But after their liberation each of them gave artistic expression to their sufferings by means of the cinema. The Norwegian resistance film, *We Want to Live*, as well as the Danish *Red Earth*, were admired for their quality. Belgium and the Netherlands similarly resorted to their painful experiences as background for films on their resistance movements.

Of all neutral countries, however, Spain was to profit the most. Shortly after the Civil War, the government entered into a policy of systematically encouraging film production. No fewer than 977 features were completed within the 6 years from 1939 to 1945. Quality, while at first a secondary consideration, improved considerably after 1943. Higher artistic standards were now being encouraged with a view to possible exports to Latin-American markets. The best Spanish film of 1944-45 was *Ines de Castro* and of 1945-46, *Los Ultimos de Filipinas*.

The cinema in the U.S.S.R. too, underwent a significant change when in 1935-36, *Peter the Great* was made by V. Petrov, the first soviet film portraying tsarist history. A good many similar subjects followed, including *Alexander Nevsky* (S. Eisenstein, 1936) and *General Suworov* (V. Pudovkin, 1939). During the war, with part of the Russian studios occupied or destroyed, and others transferred to safe regions, prestige production, such as *Ivan the Terrible* by Eisenstein, was centred on historical and biographical films of great figures of the past to stir the nation's patriotism. Another type was the documentary on war topics, guerrilla warfare or feature films of a semidocumentary character, showing the sufferings caused by the aggressors and partisan heroism (*Rainbow* and *Girl 217*). Entertainment films were largely musicals (*Spring Song* or *Musical Story*). Production after the end of the war naturally turned to subjects such as the battle of Stalingrad (*Nights and Days of Stalingrad* and *The Turning Point*). Soviet Russia, more than ever, seemed aware of the importance of its film industry. A vast construction program for cinemas was inaugurated in 1945. Production was decentralized, with studios in all the various soviet republics. Special attention was paid to the development of a new stereoscopic system, under the direction of the inventor, Semyon Ivanov.

(H. H. W.; R. MAN.)

Technical Developments

Silent and sound motion pictures were used by U.S. armed forces throughout the world. This use included the production of training films in motion-picture studios and military camps, production of public information pictures such as *Desert Victory* and *Fighting Lady*, aerial and ground combat pictures. Both 35-mm. and 16-mm. were used with much of the aerial combat work done by automatic 16-mm. cameras. Much was learned about operating camera equipment under extremely difficult climatic conditions, from the high temperature, high humidity of the South Pacific to the very low temperatures encountered in high-altitude bombing and reconnaissance.

In the war-torn countries of Europe, the production of entertainment pictures was seriously hindered and in many cases stopped completely. Equipment and parts were largely irreplaceable when they were destroyed or worn out. The studios themselves were diverted to other uses and many were destroyed. After the war studios were in the process of being rebuilt and new equipment being provided; but in Italy, France, and Germany production

was still on a very limited basis handicapped by the lack of studio and equipment facilities. Mexico, which saw a major development in the motion-picture industry with the construction of at least two new large studios, gave promise of becoming one of the important producing countries, particularly for pictures to be distributed in South and Central America.

Standards.—The Society of Motion Picture Engineers was continuously at work on standards for the industry. The Research Council of the Academy of Motion Pictures Arts and Sciences was also active in this matter, and their combined activity, stimulated by temporary standards adopted as a wartime measure, resulted in many new U.S. standards, which were to be presented by the American Standards association for international standardization. The activity on standardization continued to be reported twice a year in the *Journal of the Society of Motion Picture Engineers*.

Cameras.—In the 35-mm. professional motion-picture camera field, the decade 1937-46 saw a series of refinements looking toward quieter operation without sacrifice of reliability and ease of operation. The quest for reduction in camera noise was, of course, a result of the desire on the part of the cameramen to free themselves from cumbersome camera "blimps" and other devices required to permit the operation of a noisy camera in interior scenes involving sound recording.

The Mitchell NC camera was supplemented by the BNC camera, essentially the same except for the addition of sound-absorbing material in the external case for both the camera and the magazine. Before the war, the DeBrie camera, made in France, was used extensively in that country, in Germany and in England. Some studios, notably 20th Century-Fox and RKO, designed and built their own cameras. Technicolor continued to use a camera permitting the simultaneous exposure of three negatives. Two of these negatives were handled as a "bipack" with the third negative exposed separately. By the introduction of a filter prism combination the dual purpose of separating the light into two colour bands and directing each band to the desired film was accomplished.

In the fall of 1946 the Mitchell Camera company announced a 16-mm. professional camera similar in all details to its 35-mm. professional cameras. This appeared to be an important step in the professional use of 16-mm. film.

Optics.—The most important development in the camera lenses was that of coating processes designed to reduce the reflection of light from the lens air surfaces. Such coatings were improved as to hardness and permitted cleaning the lenses in a normal way. At the same time the efficiency of light transmission through the lenses was heightened, and perhaps of most importance the definition of the exposed image was improved, eliminating from the lens systems stray light resulting from reflections from lens surfaces.

Since cameramen must work with different lenses, a knowledge of the light efficiency of the lenses became necessary with laboratory development on a time and temperature basis. For this reason some studios arbitrarily changed the f./diaphragm calibration so that lenses of the same focal length when set at the same f./stop had the same efficiency of light transmission.

Camera Booms.—The requirement for increased mobility of cameras prompted the design and construction of a variety of camera dollies and booms. Among the camera booms constructed were relatively small ones, as developed by MGM, and very large ones in use in practically all of

the studios. In some of the larger booms the camera, in addition to being swung in whatever arc might be desired, could also be raised 20 ft. above the floor of the stage. Thus, three simultaneous motions were possible; the dolly on which the boom was mounted could be moved along a track; the boom arm could be rotated and raised or lowered, thus permitting spectacular photographic effects.

Process Photography.—By 1937, most of the process photography in use in the industry was of the so-called background projection type. In this method an especially prepared motion picture or still picture was projected by a special projector on a translucent screen. The action took place in front of this translucent screen and the camera photographed the action and the background as depicted on the translucent screen. In its first uses this system was somewhat crude and limited to light values on the process screen which were barely sufficient for black-and-white photography, and thus insufficient for colour photography. Black-and-white process work of this type was progressively improved until it reached a rather high state of perfection. Colour work also became possible and was in regular satisfactory use. In the case of still pictures projected in colour, processes were developed for transferring or cementing colour prints onto glass to prevent buckling under the high temperatures existing at the emulsion. In some cases the use of heat-absorbing water cells and suitable shutters further increased the permissible light intensity. Where a moving background was required in colour, triple-head projectors were developed by various studios to permit increasing the light on the process screen without increasing the heat on the film.

Film.—Finer-grain panchromatic picture negative stocks were produced and adopted generally throughout the industry during the decade. These included Eastman Kodak's Plus X (1231) for general work, Super XX (1232) for use where a high-speed emulsion was required and Background X (1230) for background process exterior plates; DuPont's Superior No. 1 (104) for background process exterior plates; Superior No. 2 (126) for general work and Superior No. 3 (127) where higher speed was required. Special infra-red picture negatives were also produced, including Kodak Infra-red Negative (1210) and DuPont Infra-D (105). The first commercial use of fine-grain emulsions was probably in the duplicating field where Kodak produced its duplicating positive type 1365 and duplicating negative type 1203. DuPont offered its master-positive type 228 and panchromatic duplicating negative type 108.

For release prints and sound-recording negatives in the black-and-white field, the use of fine-grain emulsions was adopted as standard throughout the industry. These included Kodak type 1302 and DuPont type 225 for release prints, Kodak types 1372 and 1373 and DuPont types 226, 232 and 236 for sound-recording negatives. Various types shown were developed for special applications in connection with variable-area or variable-density sound-recording methods.

Magnetic Recording.—Magnetic recording, as a possible motion-picture tool, was again under active consideration because of the development of iron oxide as a magnetic material used either impregnated in a plastic base or coated on a plastic or a paper base. Although the quality of such recording seemed adequate, it was too early to predict what application of it would be made.

Theatre Equipment.—At the beginning of 1936 an important advancement in sound reproduction in theatres

had occurred—the introduction of the rotary stabilizer sound-head. About that same time, two-way theatre speaker systems were also introduced. These two improvements resulted in considerable improvement in sound quality in the theatre; they also forced the attention of the Research Council of the Academy of Motion Picture Arts and Sciences on the problem of standardization in theatres. Standard practices were recommended in the field of amplifier power capacity, frequency characteristics and maximum permissible flutter. The research council prepared and made available to theatre service engineers a test reel made up of samples from various pictures.

Colour.—The three-colour imbibition process was in commercial use by Technicolor at the beginning of the decade and continued to be recognized as the best commercially available colour process. Technicolor's plant was enlarged, and the equipment and process were continuously refined. In 1944 the first complete picture was produced with the Technicolor-Monopack original process. Colour separation negatives were made in the laboratory and release prints were made by the imbibition process. A number of pictures were made by this process.

Two-colour processes were also in commercial use, including the Magnacolor and later the Trucolor processes as developed by Consolidated Film Industries and the Cinecolor process.

Before World War II it was known that Agfa in Germany was actively at work on three-colour multilayer films, both for reversible processing and for negative-positive processing. Various reports coming out of Germany, during the war and after, claimed that Agfa had developed for commercial usage the multiple-layer three-colour negative-positive process. Various techniques, such as dissolves, fades, wipes and others commonly used in the industry, presented problems which had not yet been satisfactorily solved. In the United States, Ansco made available, on a limited basis, multiple-layer three-colour reversible stocks for commercial use. Probably the various special effects required for motion-picture work could be handled with this film. The film, however, presented a new soundtrack problem because the dye-type track resulting was largely transparent to infra-red light, unfortunately in the range of both peak emission from a Tungsten light source and peak sensitivity in the photoelectric cells commonly used for sound reproduction. A blue-sensitive photoelectric cell became commercially available. Satisfactory reproduction of both black-and-white silver image sound tracks and dye-type soundtracks obtained with the Ansco process seemed possible with this new cell. The change required in theatres appeared to be of a minor nature. Commercially, no feature pictures had yet been produced and released with the Ansco process and except on an experimental basis, no blue-sensitive photoelectric cells were in use in theatres.

In the 16-mm. field, Ansco released two new reversal three-colour films, types 234 and 235, while Eastman introduced Kodachrome, type 5268. In 1943 Technicolor began the production of 16-mm. three-colour imbibition prints with blue soundtracks. The utilization of this process was largely in connection with 16-mm. reduction from 35-mm. Technicolor feature pictures, many of which were produced during the war for the entertainment of military personnel.

Sound Recording.—In sound recording, refinements were carried on progressively by the motion-picture studios and by the sound-equipment manufacturers. The variable area

type of recording was adopted by a number of the major motion-picture producers in the United States. With the increased usage of this system it became evident that a truly linear recording system was not desirable for reproduction under theatre conditions. As a result there was developed a variable gain amplifier which automatically compressed the average volume range of the recording to meet existing theatre conditions. A similar condition had previously been obtained in variable density recording by operating over the nonlinear portion of the photographic characteristic of the motion-picture film. Push-pull recording, both variable area and variable density, was adopted by a number of producing studios. New recording equipment and new speaker systems and theatre-reproducing equipment were also introduced by equipment manufacturers; each new equipment provided an improvement over that previously available.

In addition to the use of control-track and multiple-track recording as mentioned below under the section on *Animated Cartoons*, the industry took into consideration the possibility of improvement in the presentation of its shows by such devices. The Radio Corporation of America introduced to the industry a simple control-track system which could be used with standard release prints, permitting an increase in volume range and a spreading of the source of sound in theatres equipped to enjoy this improvement. At the same time it did not interfere with the normal reproductions in theatres not so equipped. Warner Brothers installed modified equipment of this general type in five theatres and released a number of pictures employing this control track. The industry in general, however, was unable to reach agreement on the subject; and the advent of the war caused a cessation of the activity. Although it was discussed again after the end of the war, no action had been taken or was contemplated at the end of the decade.

Western Electric demonstrated a three-soundtrack and control-track system of stereophonic recording and reproduction. No commercial use had yet been made of this system. Twentieth Century-Fox, in co-operation with several manufacturers, investigated the possibility of a multiple-track stereophonic recording system coupled with a 50-mm.-width film.

The close of the war brought with it the introduction of new sound-recording and reproducing equipment, all of which again represented an improvement over the equipment available before the war.

Laboratories.—Before the advent of sound, cameramen decided the lighting for scenes according to what, to their eyes alone, seemed adequate. Similarly, laboratories developed picture negatives by hand to the densities which they believed, from years of experience, would prove desirable to the particular cameramen. Sound, however, required accurate exposure and correct development, both of which were beyond the limit of proper judgment. Development to a specified gamma and density, along with other problems, necessitated the use of machines for developing sound negatives and prints and in the release laboratory required the use of machines for developing composite picture and sound prints. The practice slowly spread of including the development of all picture negative and print material by developing machines under accurately controlled conditions. This increased the desirability for the cameraman to determine his exposure by the use of exposure meters, a practice which became almost universal in the industry.

Laboratory techniques and equipment were improved considerably. New printers in both the 35-mm. and 16-mm.

fields, contact and optical, were introduced to the industry. Improvement in sound printers took place in the early part of the decade. Considerable additional improvement was known to be possible and was, in fact, realized in special printers developed and in use in one of the Hollywood studios. New developing machines were also placed in operation. Twentieth Century-Fox was reported to have, at their studio laboratory, machines wherein the directional effect had been essentially eliminated. Consolidated laboratories at Fort Lee, N.J., had in operation high-speed continuous-release print machines wherein the actual printing operation, the complete developing operation and the inspection of the finished print was a continuous high-speed process. This equipment was reported to operate at between 300 ft. and 400 ft. per minute.

Lighting.—The trend toward the use of tungsten filament lamps for set lighting increased steadily, although carbon arcs were still in use to a considerable degree because of the high intensity of the light obtained, its white character and concentrated source. The white colour was highly desirable for colour photography. Electrical and acoustical noise conditions disturbing the sound recording when carbon arcs were used had largely been overcome by improvements in the carbons and the lamps and the use of various types of electrical filters in the power supply circuits to the arc lamps. Tungsten lamps were also improved.

Perhaps the most interesting development in set lighting was the "increased-range" (I.R.) system developed by Dr. Alfred M. Goldsmith, wherein a considerable increase in the depth of focus was obtained by separately illuminating the foreground and one or more sections of the background by a flash lighting system. This lighting method, coupled with proper camera equipment, was demonstrated capable of improving the background detail without in any way sacrificing foreground detail. The system was complicated and for this reason had no commercial application at the close of the decade.

Animated Cartoons.—Walt Disney's first feature-length cartoon illustrating classical music, *Fantasia*, was presented to the public in two forms: On a roadshow basis it was presented in several U.S. cities with the picture on one film and three soundtracks accompanied by a control track on a second film. These two films were run in electrically interlocked machines to provide accurate synchronization between sound and picture. Three primary speaker systems were installed in the theatre: One centre stage, one left stage and one right stage. In some theatres additional speakers were also installed in the balconies and along the sides of the main floor of the auditorium. By reason of the three soundtracks, each with its own channel, the music was reproduced in whichever of the speaker systems was appropriate for the action shown on the screen. The volume of reproduced level was automatically controlled by the control track, which permitted a much wider range and more realistic reproduction than would be possible with a normal soundtrack. In one section of this picture, special switching arrangements were automatically brought into play to cause the voice of a singer to come from auxiliary speakers in the rear of the house while the music came from speakers behind the screen. A standard release was also made of this picture with a normal composite print containing a single soundtrack on the same film with the picture.

In order to improve the realism of animated cartoons, Disney's engineers developed and manufactured a multi-plane camera device permitting the various cells required for a given scene to be located at different distances from

the camera. This created an impression of depth in the picture which could not be obtained were the complete drawing to be photographed in a single plane.

In the *Speaking of Animals* series of short subjects produced by Scientific Films, animals were caused to speak by a process of combining animated drawings with actual photographs of animals. The synchronization of the animated lip action with the wanted dialogue was remarkably good and had a most entertaining effect.

Newsreel Equipment.—Before and during the war, single-film systems wherein sound and pictures were photographed on the same negative were further developed and refined. Military forces made large-scale uses of such equipment. An example of the quality which could be obtained with such systems was shown in the documentary picture produced by "March of Time" in the early stages of the war and released under the title of *The Ramparts We Watch*. (W. V. W.)

Educational Films.—Educational film statistics for the decade 1937-46 revealed a tenfold increase in the production, distribution and utilization of such films. Although the film had found its voice ten years before 1937, the use of sound in 16-mm. educational films was still comparatively new.

The greatest impetus to expansion of the use of films in education resulted from the extraordinary success of training films used by the U.S. armed forces in World War II. In 1943, the U.S. government became the largest producer, distributor and user of films. During the war period, U.S. expenditures for training films amounted to about \$100,000,000—more than the schools, colleges and community organizations had spent on educational films in the entire prewar history of visual education. Indeed, the U.S. government in 4 years produced 6 times as many educational films as had been produced during the previous 50 years. The armed forces completed approximately 3,900 training films, of which 2,700 were for the army and 1,200 for the navy. The U.S. office of education within a similar period completed 450 visual-aid units, each consisting of a sound motion picture, a filmstrip and an instructor's manual, for use in industrial training. Experts estimated that films increased the speed of training 25%-35%.

Of greatest significance to educators was the new emphasis on techniques of utilization. Teachers recognized the extraordinary power and versatility of the film in building information, skill and morale.

The U.S. armed forces had purchased approximately 54,000 sound projectors—32,000 for the army ground and air forces and the rest for the navy. However, only a small percentage of these projectors became postwar surplus. Most projectors were lost in action or worn out. Only a few thousand usable army and navy projectors remained, mainly in the Philippines and in Japan.

Approximately 35,000 16-mm. sound projectors were in educational use at the end of 1946. About 85% of these were in the United States. No accurate report of projectors in the U.S.S.R. was available, but informed sources revealed that the soviet government was striving to match the United States in this field, with some estimates running as high as 40,000 machines of all types, silent and sound, in operation in Russia during 1946. Most of these were probably silent machines. In India, Indonesia and China educational sound films were virtually nonexistent. In Latin America, the activity was considered to be about 5% of that of the United States.

On Nov. 14, 1946, the United Nations Information office in New York divulged plans for the production of a United Nations newsreel for release in 16-mm. to schools, colleges, churches and community groups, under the direction of Jean Benoit-Levy, noted French educational film producer, and in co-operation with the United Nations Educational, Scientific and Cultural organization (U.N.E.S.C.O.). The United Nations' plan was to follow the channels of distribution used by the U.S. Office of War Information. The OWI reported in 1945, on the completion of its job, that during the 37 months of its operation, 77,387 prints of 177 subjects were released through 324 established commercial and educational distributors. These were shown to a total audience of about 276,000,000 persons in more than 1,000,000 showings.

During World War II the Office of the Coordinator of Inter-American Affairs released about 80 sound films on Latin-American life, including some notable reels made by Walt Disney and by Julien Bryan. In 1946 the latter organized the International Film foundation, which sent camera crews to Europe and the orient for new documentary films on Poland and the U.S.S.R.

The British Information services, during the war years, produced and distributed 415 short film subjects, using an average of 35 prints of each subject. Most of these films were of temporary value during the war. The British organization later moved into the educational field with 110 subjects of more lasting value. During 1946 the British Information services circulated 5,000 prints through its own film exchanges and 5,000 additional prints through other educational libraries. Greatest in demand were the film versions of scenes from Shakespeare's *Julius Caesar* and *Macbeth*, of which an unprecedented number, said to be 1,000 prints of each, were in use at the beginning of 1947.

The British Film institute published in 1946 a report on German educational and propaganda films, indicating that on Jan. 1, 1944, all schools in Germany that had electricity were equipped with projection apparatus. At that time there were in Germany 45,346 projectors, mainly silent, and 592,000 prints of 16-mm. films, so that approximately 66% of the German schools were so equipped. During the war Germany had a ratio of 2 projectors to 3 German schools, as against 1 projector to 15 schools in Great Britain and the U.S.

Anticipating the greatly expanded use of films in civilian education after the war, the University of Chicago in 1943 established itself as a world centre for the development of classroom films. Having acquired Encyclopædia Britannica, Inc., by transfer from Sears, Roebuck and Co., the University of Chicago set up Encyclopædia Britannica Films Inc. as a subsidiary organization. It acquired from Western Electric company, on Dec. 3, 1943, the Erpi producing organization, headed by V. C. Arnsperger, and a notable library of 200 teaching sound films (increased to 250 by the end of 1946). The university also received by transfer from the Eastman Kodak company, on April 12, 1944, its library of 250 silent Eastman Teaching Films. Production of about 50 additional school films enabled Encyclopædia Britannica Films Inc. to begin the year 1947 with 500 subjects in its expanding catalogue and to become the world's largest producer and distributor of educational motion pictures. More than 100 of its subjects were dubbed in foreign languages and were available for export. Most widely used of the Britannica films were those in physics and human biology. Most popular of

the elementary Britannica subjects were *Adventures of Bunny Rabbit*, *Farm Animals* and *Gray Squirrel*.

Most notable among the new firms in the field was Coronet Instructional Films, which launched its U.S. sales program in May 1945. All Coronet instructional films were produced on 16-mm. colour stock. Other new firms included Simmel-Meservey and Young America Films, whose output at the beginning of 1947 was not yet sizable enough to evaluate.

The action of Eastman Kodak and Western Electric, as manufacturers, in divesting themselves of their educational film production and distribution departments in 1943-44 was followed in 1946 by the similar action of Bell and Howell company. That company disposed of its Filmosound library of 6,000 short subjects and features to Universal Pictures, through a new subsidiary organization closely affiliated with the British companies of J. Arthur Rank, leading international film industrialist. Consummating this unique transaction, Universal announced, on Nov. 14, 1946, the formation of United World Films, Inc., for the production and world-wide distribution of 16-mm. and 8-mm. educational, religious and family-entertainment films. For the first time a major film distributor undertook to embrace all phases of the 16-mm. field by the acquisition of the operating personnel and distributing system developed by a leading equipment manufacturer.

Thus, by the end of 1946 film-equipment manufacturers, having nurtured the infant nontheatrical film industry during its formative years, felt that the industry could at last stand on its own feet.

During the 1937-46 decade, about 600 local, state and national film libraries were developed in the U.S. These included the expanded libraries of city and county school systems, state departments of education, university extension bureaus and commercial organizations. Some idea of the expansion of such libraries during the ten-year period may be gained from the following reports:

Films Incorporated handled five times as many bookings in 1946 as in 1937; Ideal Pictures corporation, 20 times as many; Filmosound (later United World), 8 times as many. The Ohio state department of education handled 16 times as many, reporting an average daily shipment of 800 pictures in 1946, compared with an average daily shipment of 50 pictures in 1937. The University of Texas extension division, which reported 11,000 film bookings in 1937, reported 33,000 in 1946; the St. Louis board of education in 1937 had 531 prints in its film library; in 1946, it had 3,547. Film deliveries to St. Louis schools in 1937 were 8,841; in 1946, 22,485.

The Chicago board of education in 1937 had only 16 sound projectors; in 1947 it had 600—more than any other city in the world. In 1946 Chicago schools had 10,000 sound-film prints, 25 times as many as in 1937. The Chicago schools, like those of many other cities, were rapidly discarding most of their silent films. The Pennsylvania State college began its film library in 1936-37 with 100 prints; by 1947 it had 1,400. The University of Oklahoma in 1937 handled an average of 80 film bookings a week; in 1946, 220 bookings a week. The Denver schools handled 623 bookings in 1937 and 3,000 in 1946.

Indiana university, from small beginnings, expanded its service so that during the academic year 1946-47 its extension division was booking its films at the rate of 15,000 reels a month. During the summer of 1946 the university added more than 1,000 prints of films to its library.

L. C. Larson, head of the Indiana university film activity, forecast in 1946 that U.S. schools by 1950 would own

at least 200,000 projectors, or 1 projector for each 5 teachers. The American Council on Education recommended in 1945 a tenfold increase in the number of projectors for use in U.S. schools. The state-wide program in Indiana, typical of programs planned in other progressive states, was officially approved in 1946, so that state aid became available to all Indiana schools in proportion to the number of pupils. Inevitably other state departments of education would set up minimum standards for the utilization of educational films.

The Virginia legislature in 1945 appropriated \$1,112,000 for visual aids in the schools during the ensuing academic year. One of the first orders under this budget was for about 2,500 reels of Encyclopædia Britannica classroom films. In 1946 Virginia conducted a state-wide series of institutes for the development of higher standards in the utilization of school films. Other states conducting notable summer conferences included Michigan, Wisconsin and Oklahoma.

Hollywood's interest in classroom films resulted, in 1945, in the establishment at New Haven, Conn., of a research centre for text films under the direction of Gardner L. Hart, in association with the American Council on Education. In 1946 a group of 7 educational publishers (Harcourt, Brace and Co., Harper and Bros., Houghton Mifflin Co., Henry Holt and Co., Macmillan Co., Scott Foresman and Scholastic) sponsored a survey to determine where the textbook publisher, with his editorial and sales experience, might best participate in the development of educational films. A final report based on the survey was scheduled for publication in 1947. In the meantime, the group of publishers was participating with the group representing the American Council on Education and the Hollywood group at New Haven in the planning and production of five or six experimental films. These films were being financed by the Hollywood studios.

New York city in 1946 was planning a vast expansion of the use of films in its schools. Rita Hochheimer, in charge of visual instruction, recommended an initial budget of \$7,000,000 and thereafter \$3,000,000 annually to modernize teaching methods with the aid of films. She recommended the appointment of film co-ordinators in each of 800 schools. The New York city board of education thus had under consideration a plan to spend annually 60 times as much for visual instruction per year as it had spent during any previous year.

In 1946 St. Louis was spending \$1.17 a pupil per year for visual instruction; Providence, R.I., \$1.13; Rochester, N.Y., 85 cents; Newark, N.J., 79 cents; Buffalo, N.Y., 65 cents; Los Angeles, Calif., 55 cents; Washington, D.C., 35 cents and New York, 7 cents.

Meanwhile, the demand for 16-mm. sound projectors far exceeded the available supply. Equipment manufacturers reported that they were selling 20-25 times as many machines as in 1937.

The MGM studio took the lead among major film companies in 1945 in setting up a 16-mm. department in its laboratory, under the general direction of Arthur M. Loew, head of Loew's International corporation. Loew later organized a world-wide distribution of MGM films in 16-mm. He pointed out in 1946 that schools in other countries were showing interest in the educational values of features dealing with literary and historical subjects such as *A Tale of Two Cities*, *David Copperfield*, *Treasure Island* and *Mutiny on the Bounty*, when offered inexpensively in 16-mm. While MGM films were made available in 16-mm. mainly outside the U.S. and Canada, RKO Radio films in 1946 were offered in 16-mm. everywhere,

including the U.S., following the theatrical run of each subject.

During this period, new curriculum units in photoplay appreciation recommended by the National Council of Teachers of English were adopted by about 11,000 teachers of English in the United States. More than 5,000,000 copies of illustrated guides to the discussion of photoplays were published by Educational and Recreational Guides, Inc. Plans for the publication of British editions of these photoplay guides awaited the availability of paper and printing facilities. The world-wide distribution of 16-mm. versions of films of literary, historical and scientific interest gave the photoplay-appreciation movement new impetus in 1946.

During the decade 1937-46 Teaching Films Custodians made available to schools 16-mm. versions of hundreds of short films produced in Hollywood, many of them of genuine educational value, as well as long-awaited 44-min. condensations of notable full-length features. Many teachers viewing the condensed versions expressed a desire for the complete films for school use.

Courses in film appreciation were instituted during the decade in a number of U.S. universities, notably the University of Southern California, Syracuse university and New York university. The cinematography department of U.S.C. included four full-time instructors. N.Y.U. appointed the head of its motion-picture department to a full professorship. Plans for college-made educational films awaited in 1946 the general availability of 16-mm. sound cameras, notably the newly perfected U.S. equipment of J. A. Maurer, Inc. Among the higher institutions developing studios for the production of educational films were Harvard, Syracuse, Dartmouth, Minnesota, Southern California and Penn State.

So-called "free" educational films, sponsored by U.S. industrial firms, were offered to U.S. schools during 1937-46 in generous quantities. Attacks on such films as biased or lacking in authenticity were made in 1945-46 by various authorities. As a result, a group of school administrators meeting at Detroit, Mich., formulated a policy for evaluating the varying quality of free films offered to schools.

Paul Alley, television film editor of the National Broadcasting Co., revealed on Nov. 15, 1946, that approximately 60% of NBC television programs were on film, that there was no indication that this ratio would decrease and that a goodly proportion of the video programs would consist of educational films. Already experiments in the use of Encyclopædia Britannica classroom films had been conducted in New York by NBC and the Columbia Broadcasting system, with indications that when equipment became available the television networks would co-operate in popularizing the presentation of educational films on a public-service basis and without commercial advertising.

Protestant churches in 1945 began to match the interest of the Catholic church in attention to educational film values. The Protestant Film commission, with Paul F. Heard as executive secretary, inaugurated an educational film production program with plans for an initial budget of \$1,000,000.

The number of U.S. periodicals devoted wholly or partly to educational films rose from two to eight during 1937-46. To *Educational Screen* and *Film and Radio Guide* were added *Film World*, *Film News*, *16mm. Reporter*, *See and Hear*, *Hollywood Quarterly*, *Screen Writer*. Many general educational magazines began to

devote space regularly to news of films. Until 1946 the only British periodical devoted to educational films was *Sight and Sound*, a quarterly published by the British Film Institute. A new British monthly, *16 Mil Film User*, appeared in 1946. (See also CIVIL LIBERTIES; PHOTOGRAPHY.) (W. LN.)

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Motor-Boat Racing

Except for the first three years of the period, the decade between 1937-46 saw very little development in either racing boats or engines. World War II, which for six years gripped Europe and Great Britain, and into which the United States was drawn in 1941, precluded such development. It was not until the summer of 1946 that those interested in the sport could again turn their attention to the building and racing of high-speed boats.

Between 1937 and 1939, the most noteworthy achievement was the lifting of the speed record by Sir Malcolm Campbell, in the mile trials, from 124.9 m.p.h. made by Gar Wood in "Miss America X" in 1932, to 141.74 m.p.h. This he achieved in his 23-ft. hull "Bluebird," powered with a single Rolls-Royce motor developing 2,000 h.p. In 1937, he set a record of 129.5 statute m.p.h., which he lifted in 1938 to 130.93 m.p.h. and in 1939, with a new hull and the same engine, to 141.74 a record that still stood in 1946.

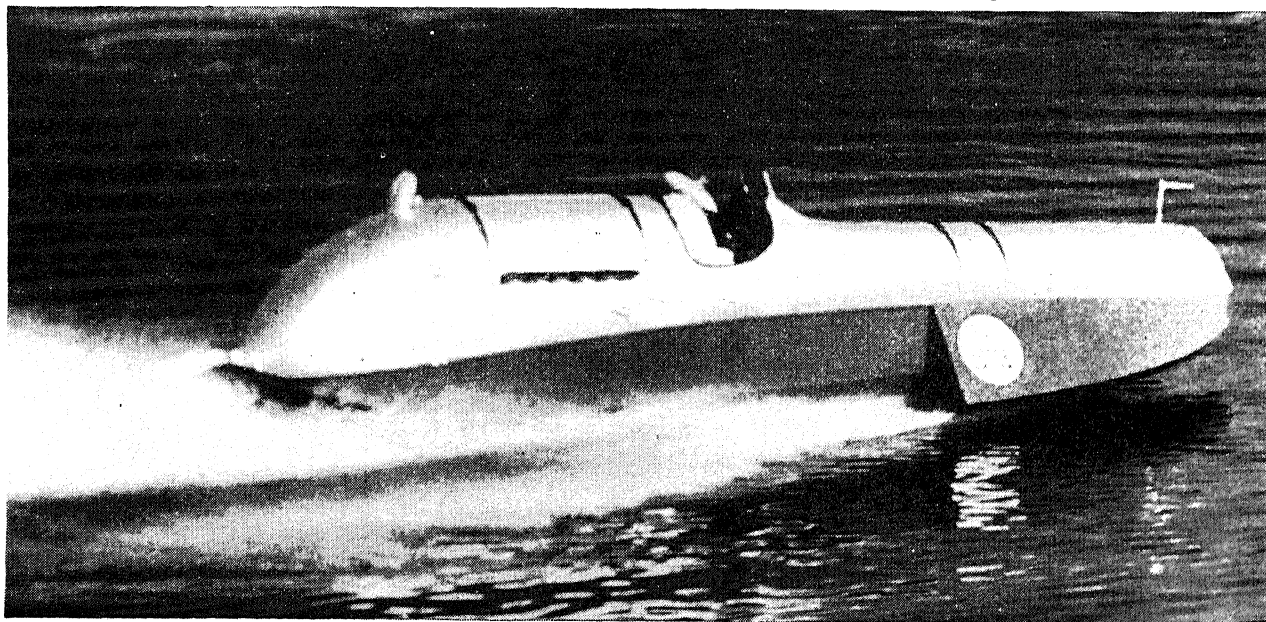
There were no contests for the British International

(Harmsworth) trophy during the decade, the cup still being held in the United States by the Yachtsmen's Association of America.

The most important U.S. trophy, the Gold cup, was raced for yearly between 1937 and 1941, the best time during those years being made by "Notre Dame," owned by H. Mendelson of Detroit, with a speed for the best 30-mi. heat of 68.6 m.p.h. but still below the 1920 mark of 70 m.p.h. Other Gold cup winners during the period were 1938, "Alagi," T. Rossi of Italy; 1939 and 1941, "My Sin," Z. G. Simmons; and 1940 "Hotsy Totsy III," Sidney Allen. Competition for the Gold cup, and higher speeds, was hampered by the restrictions of the rules, and it was not until 1946, when many of the restrictions were lifted, and the class was placed on a footing where it could become a real factor in boat and engine development, that interest was revived. In that year, the old record of 1920 was bettered for the first time when "Tempo VI," owned by Guy Lombardo, won over 17 starters and set a new heat record of 70.88 m.p.h. for the 30 mi. A new boat from the west coast, Dan Arena's "Miss Golden Gate III" set a new single lap record during the race of 77.911 m.p.h.

The other two power-boat events of national importance in the United States, the President's Cup regatta, at Washington, D.C., and the National Sweepstakes, at Red Bank, N.J., were also suspended during the war period, and were not resumed until 1946. In 1940, at the National Sweepstakes, H. Mendelson's "Notre Dame" set a heat record of 76.14 m.p.h. and a single lap record of 76.923 m.p.h. which still stood for this course at the end of 1946. Racing over the President's cup course saw no outstanding development or speed between 1937 and 1940, and it was not until after the war, in the 1946 race, that a revival started. One of the few new racers built in 1946, "Miss Great Lakes," owned by Albin Fallon of Detroit, set a 15-mi. heat record of 71.181, and a lap record of 74.258 m.p.h. This boat (raced in the Gold cup event at Detroit as the "Miss Golden Gate III"), built on the west coast, was of the three-point suspension type, powered with an Allison engine. It showed great speed in beating "Tempo VI" on the Potomac river at Washington.

"Bluebird II" in which Sir Malcolm Campbell set a new world's water speed record of 141.74 m.p.h. Aug. 19, 1939, on Lake Coniston, England



The other two inboard powered racing classes in the United States that held public interest during the war period were the 225-cu.in. and the 135-cu.in. classes. These were raced on the west coast occasion-

ally during the war period, although there were no regattas of national or international importance, and the boats established some excellent speed records, as the accompanying table of records shows.

The outboard classes also kept going during the latter years of the decade, but the racing was chiefly confined to local regattas, or to those held in southern California and on the western lakes.

On the European continent, there was a total restriction of racing activity which had not been overcome by the end of 1946. Except for a few local events in France, there was no racing in that country, Italy or the Netherlands. Steps were taken in 1946 to revive the International Motor Yachting union, parent body in European power boating affairs.

During the summer of 1946, Sir Malcolm Campbell was preparing to equip his "Bluebird II" with jet propulsion, using a jet engine driving against the atmosphere, and to attempt to better his speed record of 141.74 m.p.h. Experimental tests were made in the Admiralty tank and in a wind tunnel. However, the season was so advanced before he was ready, that the actual trials afloat, and the assault on the record, were postponed. (H. L. Str.)

Class	Boat	Owner or Driver	Locale	Date	Speed Statute m.p.h.
Unlimited	"Bluebird II"	Sir M. Campbell	Lake Coniston, Eng.	8/19/39	141.74
Gold cup, supercharged	"Noire Dame"	H. Mendelson	Detroit, Mich.	10/9/40	100.98
Gold cup, not supercharged	"Why Worry"	W. E. Cantrell	Cincinnati, O.	9/14/41	99.88
135 cu. in. hydro	"Ly Bee"	Thos. Hill	Salton Sea, Calif.	11/17/45	80.18
225 cu. in. hydro, Div. I	"Voodoo"	D. Forman	Pictou, Ont.	10/17/40	88.79
225 cu. in. hydro, Div. II	"Invader"	Thos. Ince	Elsinore, Calif.	5/17/42	77.67
Pacific one design	"Pudgy"	E. H. Cravener	Salton Sea, Calif.	11/17/45	52.35

service were handled by truck while buses and passenger cars moved the bulk of both local and intercity movement of persons. The advances recorded by all these services were the more remarkable when it was realized that they were hampered by scarcity of men and materials; and that in the interest of the war and the national economy, stringent regulations put into effect by the Office of Defense Transportation and other government regulatory bodies called for cuts in the mileage of the bus lines, directed that the routes of intercity bus lines covering much the same territory be consolidated, limited the speed at which vehicles in intercity service were to run, clamped down on sightseeing and charter bus service, curtailed the use of the private automobile, required return loads by the truckers and otherwise provided for the conservation of equipment being used to a large extent in transporting persons to and from war plants and in handling the output of these plants. In the case of all these carriers, the users of the services quickly adjusted themselves to the conservation measures recommended by the governmental agencies and to the similar measures initiated by the carriers themselves. This readjustment was especially marked in the case of the very vital school bus. It was not generally recognized that as many buses were in use carrying children to school as were used to carry passengers daily in the public transportation service. Beset by the same adverse factors that hampered the bus and the truck industries, the school bus service had to be preserved. Here again a remarkable job was done in readjustment to conserve fuel, equipment and manpower.

Outboards				
Class	Owner or Driver	Locale	Date	Speed
Midget—outboard	D. Whitfield	Washington, D.C.	9/22/46	41.478
Class A 1 hydro	T. L. DeWitt	Salton Sea, Calif.	11/19/45	50.281
Class A 2 hydro	W. Boggeman	Salton Sea, Calif.	10/28/40	49.482
Class B 1 hydro	J. Henckels	Salton Sea, Calif.	10/29/40	57.234
Class B 2 hydro	F. Vincent	Salton Sea, Calif.	10/27/41	57.009
Class C 1 hydro	Gar Wood, Jr.	Richmond, Va.	7/2/39	60.560
Class C 2 hydro	Thom Cooper	Salton Sea, Calif.	11/19/45	63.549
Class F 1 hydro	Jas. Mullen II	Pt. Mercer, N.J.	6/8/40	66.234
Class F 2 hydro	K. MacKenzie	Pt. Mercer, N.J.	6/8/40	64.293
Class X hydro	Jean Dupuy	Paris, France	5/20/39	79.04
Class X hydro	C. R. Ferguson	Worcester, Mass.	11/1/39	78.44

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Motor Carrier Act

See LAW.

Motor Racing

See AUTOMOBILE RACING.

Motor Transportation

The phrase "ten eventful years" epitomized the situation in the road transport industry over the period 1937-46. The first part of that decade saw a very material growth of both the bus and the truck industries and was marked by a material advance in design and engineering, but great as these advances were they paled into insignificance in the light of the task that the industries were called upon to surmount during the war years. That these two were high among the United States industrial sinews which helped materially to win World War II there was no gainsaying.

During World War I, motor transport was of relatively minor importance, but it assumed vital significance in all forms of activity at the start of the second world conflict. The bulk of the local transportation of property and a considerable part of the tonnage moving in intercity

Table I.—U.S. Local Transport Bus Operations
(City and City-suburban Carriers)

Year	No. Buses Owned	Operating Revenue (millions)	Revenue Passengers* (billions)	Total Bus Miles (millions)
1936	22,000	183.7	2,571	750.0
1937	24,500	186.3	2,737	811.2
1938	29,200	216.2	3,185	1,019.3
1939	30,335	235.3	3,373	1,162.7
1940	33,550	259.6	3,820	1,194.5
1941	37,855	306.8	4,544	1,209.5
1942	44,111	449.0	6,500	1,453.0
1943	45,610	535.4	7,377	1,425.0
1944	48,525	614.8	8,609	1,630.0
1945	50,625	644.5	8,650	1,605.0

*Excludes free transfers.

These general statements were substantiated by the statistics of the industry and buttressed by the printed accounts of the extent of the ingenuity and the resources of management and men.

Long before Pearl Harbor, the impact of industrial production for war had posed a real problem for the motorbus carriers operating in the intercity and the city fields. In fact, the U.S. bus industry faced a major crisis as early as 1940. Aid to Great Britain and rearmament were rapidly bringing the industry face to face with critical shortages of essential bus maintenance materials and repair parts. To most people business as usual was still the order of the day, but not so the bus industry. Following the attack on Pearl Harbor the demands for transportation in both these fields imposed a burden that was almost insuperable. The whole war effort centred about the problem of transportation by the intercity bus, the city bus, the private automobile, the railroad and the aeroplane, with

216 the truck lines playing an ever increasing part in the transportation of goods and the materials of war. At the same

Table II.—U.S. Intercity Bus Operations

Year	No. Buses Owned	Operating Revenue (millions)	Revenue Passenger (millions)	Total Bus Miles (millions)	Estimated Revenue Passenger Miles (billions)
1936	24,750	\$275.0	500.0	1,250.0	8.7
1937	24,750	190.1	390.0	1,026.0	9.5
1938	20,000	177.4	373.7	990.9	9.6
1939	18,614	167.9	313.4	853.8	9.5
1940	18,000	174.2	361.4	893.6	10.1
1941	18,420	204.7	372.2	999.4	12.0
1942	22,710	355.0	617.0	1,195.0	18.7
1943	28,504	430.0	963.0	1,320.0	28.0
1944	28,000	563.8	1,083.9	1,523.5	33.3
1945	31,250	576.0	1,092.0	1,560.0	36.2

time, the manpower needs of industry engaged in the war effort and the requirements of the armed forces began to drain off manpower and materials needed to keep the buses and the trucks rolling. Despite the handicaps under which the trucks and the city and the intercity buses operated, with the number of trucks and buses practically frozen so that there were little or no replacements, both of these services carried on with a great degree of efficiency. Thus, on the basis of reports made to the Interstate Commerce Commission by Class I for-hire truck carriers, traffic during the latter part of the war period was 19% above the 1941 level, but increases in efficiency made it possible to require only 90% of the mileage operated in 1941 to perform the service. In the intercity bus field, the record rose from 617,000,000 revenue passengers in 1942 to 1,092,000,000 in 1945 and in local bus service from 6,500,600,000 passengers in 1942 to 8,650,000,000 in 1945. In the same period, the number of buses in each class of service increased from 22,710 to 31,240 and from 44,101 to 50,625 respectively. Civilian motor truck production declined from 770,617 in 1936 to only 2,888 in 1943 and 119,031 in 1944.

Both the truck and the bus industries fought unremittingly to see that they received the recognition from governmental agencies to which they were entitled—material and supplies concomitant with the essential services that they were performing as factors in the domestic economy by transporting the civilian population, handling the war workers, supplying service to the various camps and at points of embarkation and in trucking materials and supplies essential to furthering the war effort. That was not easy, even with the associations representing the carriers, their trade papers and the Office of Defense Transportation battling for them. The army had great need for many of the automotive parts essential to the domestic carriers, and ODT, the claiming agent for materials needed by the carriers, had to prove its case with the Petroleum Administration for War and other agencies set up to further the war effort.

Table III.—New U.S. Buses Put Into Service

Year	Type		Average Seating Capacity		School
	City	Intercity	City	Intercity	
1936	5,800	2,610	28.9	24.5	8,913
1937	5,947	2,430	28.1	26.5	9,892
1938	3,606	2,167	26.9	28.2	11,272
1939	4,594	2,415	31.3	27.9	11,546
1940	4,573	2,001	31.9	30.7	10,566
1941	5,873	2,088	32.6	29.2	8,622
1942*	9,510	3,968	35.5	33.3	1,856
1943*	2,070	1,691	30.6	31.7	206
1944*	4,323	1,927	33.3	33.4	3,192
1945*	5,908	3,508	33.6	34.1	8,225

*Exclusive of trailer-type buses.

The functions and duties of the Division of Motor Transport and the Division of Local Transport, the first established in Dec. 1941, and the latter in Jan. 1942, and

both consolidated on June 1, 1944, into the Highway Transport department of ODT, were to advise and assist federal departments and agencies, state and local governments and private organizations in surveying the need for and planning transportation service to move personnel to and from war plants and establishments. Where necessary, the two divisions initiated and developed surveys and plans for transportation in each area, including those related to the production and the war effort, agricultural as well as industrial, to military and naval establishments, and to essential civilian services. At the time of the consolidation of the former Division of Motor Transport and Division of Local Transport, the combined personnel of the two divisions numbered 3,897, with 177 in Washington, D.C. and 3,719 in the field under a setup that divided the country into nine regions with regional and district offices.

U.S. Truck Industry.—Developments in the U.S. truck industry over the decade 1937-46 generally followed the pattern in intercity bus operation. In the first half of that period the tendency, as in the bus industry, was toward consolidation with the result that the industry was prepared at any time to go anywhere in the country with any loads. As the United States turned toward war production, the tonnage handled by the trucks increased; after the country entered the war, tonnage increased by leaps and bounds. Following Pearl Harbor, the truck lines found themselves beset by problems similar to those of the buses. There were shortages of manpower and materials. Here again, as in the bus industry, the government stepped in through the Office of Defense Transportation and set a pattern for the truck lines which was intended to have them contribute most to the war effort without dislocating their contribution to the general domestic economy. This was a tremendous problem. In the more or less normal period 1936-40, the average demand for new trucks

Table IV.—U.S. Truck Registrations by Year

Year	Number
1936	3,987,339
1937	4,255,296
1938	4,224,031
1939	4,413,692
1940	4,590,386
1941	4,676,054
1942	4,608,086
1943	4,480,176
1944	4,513,340
1945	4,650,000

was approximately 550,000 a year. Had this demand continued during the war period, approximately 2,567,000 new trucks would have been required from the time of the freeze of new commercial motor vehicles on Jan. 1, 1942, through Sept. 22, 1945, the time of the end of rationing. During that period, however, only 524,637 trucks were released to civilians. In other words, truckers actually received the equivalent of only 25.4% of their normal needs. The expected life of the truck varies widely. Thus, during the time that rationing of equipment was in effect, only 12.1% of the normal needs of light equipment were met, 34% of the medium and 87.2% of the heavy, or the equipment most essential to handle war materials. In general, mileage demands of trucks generally increase with the size of the equipment. This results in a service life much shorter in years for the heavy equipment than for light equipment. Account must also be taken of the fact that, prior to World War II, style obsolescence rather than ability to keep equipment in operation was largely a governing factor for truck operation in retail and wholesale distribution and other fields. Full account was taken of this factor by the ODT in the allocation of vehicles. In consequence, the principal recipients of equipment were in the heavy truck group,

namely, carriers engaged in petroleum distribution, in mining, logging, printed matter, wholesale food, manufacturing and lumber delivery, in all of which the demands were heavy. Generally, the same groups were above average in the number of light and medium truck allocations. As for the extent of the industry, about 2,000 truck carriers with gross receipts in excess of \$100,000 a year had reported to the Interstate Commerce commission. There were, of course, great differences in the truck operating characteristics in different parts of the country. The average wage of employees in the trucking industry was \$2,395 for the year 1944 compared with an average for all private industry of \$2,189. In the same year, 45% to 50% of all motor carrier revenue was paid out in wages. According to the American Trucking association, the average intercity truck operated 139 mi. per trip, paid \$1,403 in taxes a year, ran 43,925 mi. per year, got 4.8 mi. per gallon of gasoline and 82.9 mi. per quart of oil, earned gross revenue of 32.2 cents per vehicle mile and 3.8 cents per ton mile; took in gross revenue of \$15,099 a year, carried 2,230 tons of freight a year, hauled 393,261 ton miles of freight a year and carried 8.39 tons per load. For every power unit in operation the Class I carriers averaged 3.21 employees. The average revenue per carrier was \$515,682 a year. On a national basis, the Class I carriers leased 21.2% of the equipment they operated, but conditions differed widely in various parts of the country, ranging from a low of 2.9% in New England to a high of 35% in Illinois, Indiana, Ohio and the lower peninsula of Michigan. Intercity carriers used more tractor trailer combination units than they did ordinary straight trucks, the ratio being 143 tractors for every 100 straight units. On the other hand, local carriers operated only 41 tractors for every 100 straight trucks. For every 100 tractors operated by the intercity carriers there were 123 trailers or semitrailers, while local operators had 175 trailers or semitrailers for every 100 tractors. Farmers used more than 1,630,000 trucks and these, together with those operated by truckers, delivered half of all livestock and farm produce shipped to market. Railroads were operating almost exactly ten times the number of trucks in intercity service that they did in 1930.

Prior to the enactment of the Federal Motor Carrier act in 1935, which placed both trucks and buses under jurisdiction of the Interstate Commerce commission, each truck carrier had its own rates, which could be changed at will. Consequently there was much destructive competition. The railroads, among others, had urged that the motor carriers be placed under federal regulation, but the over-the-road carrier also favoured this move as a means of stabilizing the industry and bringing an end to destructive competitive practices. As a result of their being brought under regulation, the motor truck carriers were required to publish tariffs clearly stating their rates and charges, the tariffs to be open at all times to public inspection.

The increase in operating expenses which confronted the carriers during the period that they were subject to the jurisdiction of ODT was offset to some extent by a rate increase granted during World War II. In the property field, interstate property motor carriers were allowed to follow the general increase of 6% granted to rail carriers early in 1942. Motor carriers of property east of the Mississippi generally were granted a further increase of 4% through various decisions in the latter part of 1943 and early in 1944. These emergency charges were to expire at the end of 1945. As for the interstate carriers of passengers, they were allowed a 10% increase in rates early in 1942 following the approval of a similar increase in rail coach fares. The increase was generally applied by the passenger

carriers, but in the case of the truckers their ability to take advantage of the increase depended upon their competitive location compared with the railroads and even with other motor carriers.

The truck carriers were confronted in 1946 with a desperate need for more revenue. Early in that year, the truckers in the Central region, New England region and the middle Atlantic region filed applications for increases to make their rates roughly 25% higher than the rail rates. It was said then that the carriers in the southern region were preparing to take similar action. The I.C.C. allowed these increases to become effective, with hearings to be held later to determine their reasonableness. So far as the interstate bus lines were concerned, it was indicated in the summer of 1946 that the Interstate Commerce commission proposed to conduct an inquiry into their rates at hearings during the fall. Meanwhile the way was being cleared for a comprehensive study of the entire transportation situation by a congressional committee.

U.S. Sightseeing and Limousine Services.—As indicated previously, orders of the Office of Defense Transportation, notably general order No. 10, effective Sept. 10, 1942, put an end to sightseeing and other similar services, such as the chartering of buses. Even if no order of this kind had been issued, the bus carriers would have abandoned these services of their own volition. The exigencies of the situation would have dictated it. In the first place, the war demands made it necessary that every available vehicle be diverted to essential service. In the second place, the companies, beset by lack of manpower, vehicles and parts, were in no position to do anything more than try to cope with business being normally offered, business that had increased many times. With the end of World War II and the prospect that vehicles were likely soon to be available in increasing numbers, the management of companies which had run sightseeing and charter services made plans to return to supplying these well-paying types of service. Toward the end of 1946, although vehicles were still in short supply for city and intercity services, the carriers were reviving "blind excursions," on which the bus driver started out with orders he did not open until well on his way. In the north, buses were running again in the winter to ice carnivals and other outdoor winter sports events; chartered buses were again in operation. Thus, in the summer of 1946, the Associated Gray Line companies throughout the North American continent were back in full operation. The extent of this operation was evident in the fact that there were a number of companies in 65 cities which operated more than 250 sightseeing tours.

The U.S. School Bus.—Under the dire necessity of operating buses under wartime shortages of men, materials and vehicles, the primary objects of comfort for the transported pupil and safety and economy in operation of the vehicle were maintained. Nation-wide statistics revealed the extent to which this essential service was preserved. Successful operation of these vehicles was brought about by an almost complete revaluation of operating practices, maintenance, housing and even of specifications, to say nothing about a reappraisal of the training of the drivers and mechanics. Men were trained for replacements, new central districts were formed and other buses were redistributed. Consolidation and other expedients were disclosed by constant surveys of wartime school bus needs.

School bus officials were confronted by the fact that new buses, station wagons and sedans were frozen in the possession of dealers and manufacturers. To help the school bus

officials, a handbook, *School Transportation in Wartime* was issued as the outgrowth of work conferences at New Haven, Conn., and at Washington, D.C., prepared for and approved by the National Council of Chief State School Officers. Out of their conferences, in which representatives of the automotive industry and the American Automobile association participated, came a general nation-wide policy, together with a unified maintenance program including driver training. The suggestions made were not intended to be rigid, and school officers were free to modify them in the light of their experience under wartime operation.

As for the postwar school bus, it appeared likely that it would be constructed of lighter and stronger metals, that it would be equipped with larger engines with maximum torque at considerably lower revolutions per minute, that engine speeds would be governed instead of relying on road speed, and that adjustments would be made to compensate for higher octane rated gas. It was also expected that controls such as brakes, stoplights and directional signals would keep pace with highway improvements and expansion. It appeared unlikely that over-all width, seat and aisle width and seating capacity would change, but, as indicated previously, gross vehicle weight in comparison with pupil capacity was likely to be reduced.

Other Postwar Plans.—Despite the fact that the city and the intercity motorbus carriers were beset by a thousand and one problems during the wartime years, the managements were alert in planning for the future. Both types of carrier moved rapidly toward putting into effect plans for improvements and expansion of their services. It was planned, for instance, to spend about \$40,000,000 to modernize bus and streetcar equipment in New York city, about \$25,000,000 for similar improvements to the surface transportation system in Chicago, Ill., \$22,000,000 in Detroit, Mich., \$10,000,000 in Boston, Mass., \$5,000,000 in Los Angeles, Calif., and more than \$20,000,000 in San Francisco, Calif. There was a great amount of deferred maintenance, and a need to replace and augment a vast amount of rolling stock that had long been used beyond its life expectancy. Amounts proportionate to those of the larger cities were appropriated in the smaller cities and communities. In the intercity field, the National Association of Motor Bus Operators estimated that \$42,000,000 would be spent to construct and remodel terminals and garages, and that 6,000 buses would be purchased for intercity service at an estimated cost of \$90,000,000, with another \$10,000,000 earmarked to rehabilitate equipment. Greyhound alone announced that it would spend \$35,000,000 in the initial stages of a vast postwar program to provide better equipment and terminal facilities for its subsidiaries.

Particularly in the intercity field, the new vehicles were being designed to secure added comfort for the passenger. Thus, air-conditioned trolley buses were introduced in Atlanta, Ga., and air-conditioned motorbuses were placed in service in San Antonio, Texas. Both the intercity and the city carriers were alert to the possibilities of the helicopter with the result that about 100 companies in both fields, in the United States and Canada, filed applications for the operation of helicopters or other craft in connection with the operation of their surface vehicles. Still another development was the use of two-way radio by the bus lines as a means of providing contact between the vehicle on the road and the dispatcher to clear traffic congestion and aid in emergencies such as vehicle failures on the road and accident.



By presidential order, U.S. soldiers took over trucking operations when Chicago teamsters went on strike May 16, 1945, in a dispute over wages and hours. Army personnel functioned as drivers and escorts

It seemed probable at the end of the decade 1937-46 that the road bus would meet its greatest competition in the private automobile. It appeared, therefore, that two distinct types of vehicles might be developed to meet the travel requirements in every section of the country—a smaller vehicle to handle the business of the feeder lines and the short runs between cities, and the “leviathan” of the road, similar to the two-level, tractor-trailer design of the Santa Fe Trail Transportation company, with seats for 117 passengers. Designers realized the necessity of providing equipment equal, in advance engineering, to the highways that would be provided for its operation. The Santa Fe vehicle could be taken as a precursor of things to come in the over-the-road vehicle.

The design of vehicles undoubtedly would take into greater account the need for simplification of the power plant; with the emphasis on accessibility of all parts for easy repair and the interchangeability of the power and other units.

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Great Britain and Other Countries.—Between the two world wars Great Britain's motor transport industry, following a lengthy inquiry by a royal commission in 1930, worked under progressively increasing government control. The Road Traffic act of 1930 enforced certain safety measures in connection with passenger vehicles; provided the machinery for regulating passenger services, and made compulsory third-party insurance for owners of all mechanically propelled vehicles. The Road and Rail Traffic act 1933 imposed a licensing system for good vehicles (under the jurisdiction of the traffic commissioners appointed earlier to deal with passenger licences) whereby the holding of a public carrier's licence was subject to fair wages and conditions of employment for drivers, and observance of regulations in regard to speed, drivers' hours, safe loading and proper maintenance of vehicles. The Road Haulage Wages act 1938, provided a wages board for the statutory regulation of wages and conditions of operatives employed by “A” and “B” licence holders.

Passenger transport undertakings developed quite independently, the licensing control being completely different.

The system of licensing favoured consolidation both of private and municipal undertakings and, furthermore, the railways took a large share interest in many of the larger nonmunicipal undertakings.

Table V.—Motor Vehicle Licences in Great Britain

	Private Cars	Motor Cycles	Hackney Carriages (Buses, Coaches & Taxis)	Goods Vehicles
1937	1,798,105	487,578	85,766	478,922
1938	1,944,394	462,375	87,730	494,866
1939	2,034,400	418,000	90,000	488,000
1940	1,423,200	278,300	81,300	443,900
1941	1,502,600	317,000	85,100	450,200
1942	857,700	305,900	85,100	453,000
1943	717,500	123,700	86,700	449,400
1944	755,400	123,900	90,400	447,800
1945	1,486,600	309,100	98,700	473,100

A number of restrictive regulations were withdrawn during World War II such as the limitation of standing passengers in buses. Rubber and fuel shortages caused cancellation of all but essential services, and black-outs, wooden seats, and the like, made travelling far from comfortable. Many buses were commandeered for service needs, and during "blitz" periods it was customary to see buses hundreds of miles from their base.

After the cessation of hostilities buses were in short supply everywhere, many of the larger undertakings having placed orders running into millions of pounds, with delivery promised in a year or two. There were, therefore, inescapable queues, very rough vehicles and a slow but general appreciation that the morning and evening peak loads could only be met by the staggering of hours. Fuel supply was still somewhat limited although permits were granted for a resumption of coach tours as distinct from ordinary buses, and occasional long-distance services were reopened. War conditions had caused well over 1,000,000 private cars to be laid up, most of which, however, were back on the road, with restricted fuel allowances in 1946. Great Britain was second to the U.S. in the number of cars and it has been estimated that under more normal conditions the number might reach 4,000,000–5,000,000 within ten years.

Consequent upon World War II, the economic situation, short supplies and transport difficulties, fuel rationing was still in force at the end of 1946 and the wartime procedure functioned for all classes of vehicles. Buses automatically obtained permission from the traffic commissioners for all journeys undertaken. Goods vehicles were controlled by an emergency road transport organization, introduced shortly before the war and largely voluntarily staffed by the operators of commercial vehicles, such persons being cognizant of the traffic requirements of Great Britain. Twelve regions, similar to the civil defense regions, were formed, and these then were broken down into districts and subdistricts. All operators were requested to form themselves voluntarily into groups, where possible engaged on similar work. Vehicles on nonpriority work were allowed a bare minimum or entirely refused supplies. The scheme was successful and terminated only at the end of the war; thereafter allocations were made to individual operators by traffic officers of the ministry of transport working on a subdistrict level.

Before World War II goods vehicles numbered about 500,000; 70% were operated by traders and restricted to the carriage of their own goods under a "C" licence while the remaining 30%, owned by about 60,000 operators, formed the fleet public goods vehicles of which 95,000 were under "A" and 50,000 under "B" licences. Competition between rail and road was so acute that the British railways, just before World War II launched a "square deal" campaign. This was an attempt to secure greater freedom for rail, or, alternatively, more restriction on

road traffic. As a result, discussions between rail and road interests were inaugurated through the transport advisory council (set up to advise the minister of transport on all transport matters), a road-rail conference emerged and some progress was made toward finding a mutually satisfactory solution to the problem. Wartime conditions, however, slowed down the work of this body. Good progress was made after the defeat of Germany; relations with the railroads became more friendly, and apart from such interim measures as joint licensing committees, set up for the purpose of minimizing objections in the traffic courts, a road-rail plan for the complete co-ordination of inland transport was evolved in July 1946 and approved, not only by all carrying interests, but also by the traders. In 1945, however, the government introduced its Transport bill to nationalize all forms of transport. This provoked considerable opposition from transport owners and producers, and the fate of the voluntary plan for co-ordination became doubtful.

During World War II all goods transport was greatly restricted by fuel rationing and defense permits were substituted for licences. All classes of operators notwithstanding previous licence restrictions were allowed to carry essential goods.

In 1941 the minister of war transport, in collaboration with the road transport (goods) industry, introduced a voluntary scheme for the control of essential movements by road. Before this scheme was fully working Japan's attack worsened the rubber and fuel situation, and road transport had to be severely curtailed. Long distance work, *i.e.*, road haulage between points more than 60 or 70 miles apart, became even more difficult. Yet, road haulage proved invaluable in clearing ports during the worst blitz conditions. The minister of war transport set up a road haulage organization, with which long distance road operators registered their vehicles. Certain of the larger operators became controlled undertakings, *i.e.*, the ministry of war transport hired their physical assets guaranteeing an agreed profit; the rest, working under the direction of controlled undertakings, were engaged on a period hire basis. At the same time, under defense regulations, the movement of goods by road in excess of 60 road miles was prohibited, unless conveyed by the road haulage organization or under a permit issued by regional transport commissioners. Under this arrangement, the minister could lay up vehicles while assured of full operational strength.

In the late 1930s a number of European countries constructed strategic roads. Thus, Germany's attacks on Austria, Czechoslovakia, Poland, France, the Low Countries, and later Russia, were greatly facilitated by its *autobahnen*. A number of principal railways in Europe were subject to state control which sometimes included certain sections of road transport. Always, development of road transport was retarded to protect the more established forms of transport, whether under private or under state ownership. In 1946, incomplete wartime statistics did not allow for a detailed survey of commonwealth development but the same conflict between rail and road existed as elsewhere, and in nearly all cases road transport was progressively restricted in the vain hope of solving the problem (as in Austria, Belgium, Czechoslovakia, Denmark, France, Germany, the Netherlands, Hungary, Italy, Poland, Rumania, Sweden, Switzerland and Yugoslavia). In general, the difficulty continued of balancing the public interest with the interests of established undertakings, which, in some spheres had outlived their usefulness. In Great Britain,

the full co-ordination of inland transport envisaged in the road-rail memorandum of July 1946, indicated a logical method of approach to a world-wide problem. (See also ACCIDENTS; AUTOMOBILE INDUSTRY; DISASTERS; HORSES; INTERSTATE COMMERCE COMMISSION; MUNITIONS OF WAR; RAILROADS.) (L. GL.)

Motor Vehicles

See AUTOMOBILE INDUSTRY; ELECTRIC TRANSPORTATION; MOTOR TRANSPORTATION.

Motta, Giuseppe

Motta (1871–1940), Swiss statesman and scholar, was born in Airolo, Switzerland, Dec. 29, 1871. He was educated at the universities of Freiburg, Munich and Heidelberg. Elected to the national council in 1899, he was chosen president of Switzerland in 1915 and was re-elected four times, the last time in 1937. He was also honorary president of the League of Nations. When he died at Berne, Jan. 23, 1940, he was serving as chief of the Swiss political department.

Mottas, Carlo Carmelo de Vasconcellos

See VASCONCELLOS MOTTAS, CARLO CARMELO DE.

Mountain Warfare

See TACTICS OF WORLD WAR II; WORLD WAR II.

Mountbatten, Viscount Louis

Viscount Mountbatten (Louis Francis Albert Victor Nicholas) (1900–), British peer and naval officer, was born June 25, 1900, in Frogmore house, Windsor, England, as Louis Francis Albert Victor Nicholas of Battenberg. His mother, Princess Victoria, was a daughter of Grand Duke Louis IV of Hesse and a grand-daughter of Queen Victoria. His father, Austrian-born Prince Louis Francis of Battenberg, was grandson of Louis II of Hesse and a cousin of King George. In 1917, the father relinquished his position and titles and resigned as an admiral of the fleet because of anti-German sentiment and changed his name to Mountbatten, the English equivalent of Battenberg.

Young Mountbatten entered the royal navy at the age of 13 and served during World War I as a midshipman aboard two battleships. After the war, he was named per-

Viscount Louis Mountbatten shown with Generalissimo and Mme. Chiang Kai-shek on his arrival at Chungking in Nov. 1943, to head the southeast Asia command



sonal aide-de-camp to the prince of Wales, and accompanied the prince on his tours to the far east in 1920 and 1921. Continuing his service in the navy, he rose through the ranks to the grade of acting vice admiral in March 1942.

Early in World War II, he was given command of the destroyer "Kelly," which was twice damaged in war action at sea; Mountbatten succeeded in bringing the ship safely back to port each time. In 1940 Mountbatten took the patched-up "Kelly" to the Mediterranean; this time the craft was sunk by nazi divebombers in the Crete fighting in 1941. Mountbatten was picked up by another destroyer.

In April 1942, Mountbatten succeeded Sir Roger Keyes as chief of combined operations and supervised commando operations off the coast of Norway and France. During their consultations in Quebec in Aug. 1943, President Roosevelt and Prime Minister Churchill agreed on Mountbatten's selection as supreme commander of the newly created southeast Asia command, and the following month he was made acting admiral.

In 1944–45, Mountbatten directed Allied operations against the Japanese in Burma. After the close of the war, he accepted the surrender at Singapore on Sept. 12, 1945, of all Japan's southern armies. He continued in his command, and on May 26, 1946, it was disclosed that he was succeeded by Lt. Gen. Montague G. N. Stopford. He was created a viscount on June 12, 1946, and was appointed viceroy of India in 1947.

Mozambique

See PORTUGUESE COLONIAL EMPIRE.

Muang Thai

See SIAM.

Mufti, Grand, of Jerusalem

See HUSSEINI, HAJ AMIN EL.

Mukden (Shenyang)

By 1937, Mukden (which the Chinese call Shenyang), largest city of Manchuria, with a population of 1,135,801 (Dec. 1940), had been under Japanese occupation for six years. The "Mukden incident" of Sept. 18, 1931, was generally regarded as the beginning of World War II.

The Japanese five-year development plan of Manchuria, initiated in 1936 and revised in 1938, aimed at making Manchuria the arsenal and the granary of the Japanese empire through exploitation of its rich natural resources and cheap labour. Mukden, the main railway junction and trading centre of Manchuria, became one of the most important industrial centres of the far east during the Japanese occupation.

It was estimated that 3,000 factories were located in Mukden, representing a very substantial portion of Japan's overseas investments.

On Aug. 20, 1945, the soviet army entered Mukden. After almost half a year of occupation, the soviet army was evacuated from the city. The troops of the Chinese government entered Mukden on March 12, 1946. Reports from all sources stated that the soviet troops had removed most of the industrial equipment in Mukden, regarding it as legitimate "war booty." Mukden did not suffer direct damage from the war. The removal of its industrial equipment, however, was a very severe blow to the livelihood of the people of the city.

During the period immediately following the war, Mukden also became the political centre of Manchuria, the city of Changchun (Hsinking) being for some time in the hands



Textile factory in Mukden, one of the Manchurian plants stripped of machinery by Red army troops before their evacuation in the spring of 1946

of the Chinese Communists. The chief political agency in Mukden was the northeastern headquarters of the generalissimo (Chiang Kai-shek), headed by General Hsiung Shih-Hui. The city also resumed its former position as the capital of Liaoning province. (C. CN.)

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Mules

See HORSES.

Munich Pact

See CZECHOSLOVAKIA; FRANCE; GERMANY; GREAT BRITAIN AND NORTHERN IRELAND, UNITED KINGDOM OF; ITALY; WORLD WAR II.

Municipal Government

The decade 1937-46 reflected three distinct phases in the history of municipal government in the United States: (1) emergence from the depression period of the early '30s from 1937-41; (2) the war period, 1941-46; and (3) planning for "reconversion," 1943-46. The imprint of these three phases of municipal history can be traced clearly in the general improvement of the fiscal and administrative affairs of the cities as they emerged from the depths of the economic depression; in the intensified relationship between the cities and the federal government during the war emergency; in the impact of the war on municipal finance and personnel; in the abandonment of capital improvements during the war period; in the postwar planning activities of the cities; in the war and postwar housing crises; and in various related developments.

Characteristic of the prewar period were the problems of relief and unemployment; the unresolved conflict in federal-state-local fiscal relations; the recurrent problem of insufficient municipal revenues; the inadequacy of

training programs for municipal personnel; and the need for long-range municipal and fiscal planning. World War II itself raised new problems in the fields of municipal finance and personnel; also problems of defense organization, of provision of emergency facilities in war-congested areas and of the need for postwar planning. It also brought the cities a financial prosperity such as they had not known for years, but which did not blind them to the greatly expanded fiscal demands which would be placed upon them to meet the growing community services they would be called upon to provide. The great problem of urban blight, with its disastrous effects on the economic status of metropolitan areas, emerged in this latter period as an inseparable phase of the entire housing problem.

An interesting aspect of the decade 1937-46 was the development of certain major concepts, some possibly for the first time. Paramount among these was the increased recognition of the role of the cities in the nation and in the world. The rise of the cities to a dominant position in U.S. life had been a phenomenon mainly of the 20th century. It was particularly emphasized in the depression period, when the concentration of population in the cities created a major relief problem which had to be handled on a national scale. This dominant position of the city in the national life was given its first official recognition by the report of the National Resources committee, *Our Cities—Their Role in the National Economy*—noted more fully below—which was published in 1937 and was followed in 1938 by the supplementary report of the Urbanism committee in the two volumes: *Urban Government* and *Urban Planning and Land Policies*. In the war period, the cities became the great production centres on which the outcome of ultimate victory or defeat largely depended. And in the peace, it was the cities which bent their energies to postwar development along the necessary physical, economic and social lines. The new alliance between governmental, economic and social factors was a definite development of the decade.

Another concept particularly notable during this period was the renewed interest in "home rule" and the revital-

ization of local government. This movement was indicated by efforts to awaken citizen interest in government, as by the organization of "Citizenship Days" with impressive ceremonies surrounding the induction of voters. It was manifested in local opposition to proposals for federal aid for urban redevelopment and for education, in local initiative in the development of new revenues and preparation of postwar plans and in the exemption of the cities from various federal wage stabilization and unemployment regulations applicable to industry during the war—all based on the desire of the local governments to maintain their relatively independent status. The activities of the Council on Intergovernmental Relations, described in a later section, were also motivated by the desire to strengthen the local level of government by segregating and decentralizing strictly local functions and by strengthening their performance on a co-ordinated basis.

A further evidence of this effort to establish and revitalize local institutions was apparent in the resurgence of interest in metropolitan problems and the effort to achieve broad metropolitan federations as a method of preserving local self-government, arresting urban blight and, possibly, regularizing urban and industrial decentralization primarily to meet the needs of peace, but also to serve as a better defense in case of atomic war. In spite of the continued spread of urban populations into suburban areas, the period was one of few territorial annexations to cities.

The recognition, on the other hand, of the need for a proper basis of relationship between the federal, state and local governments led to marked activity in the field of intergovernmental relations, particularly regarding fiscal matters.

The war emergency organization intensified these relationships and contributed to their development on the regional and intermunicipal planes.

One further development may be noted: the rapid growth in the number of employee organizations or unions and the increasing conflicts between such organizations and city governments. The marked progress of labour unions in the industrial field during the decade undoubtedly stimulated this condition.

Settlement of the legal issues involved and crystallization of policy had perforce to wait until the termination of the war.

Intergovernmental Relations.—The emergencies of the depression and war eras laid the basis for the deepening interrelationship between the municipalities and the state and national governments. While nothing like the degree of centralization of municipal functions in the national government which had taken place in Great Britain, for instance, had as yet occurred in the United States, there were increasing indications of the need for clarification, in the interests of local self-government, of the lines of relationship which had developed between the municipalities, the federal government and the states.

Direct federal-city relations were born of the relief needs of the depression period. Federal aid, in the form of Work Projects Administration and Public Works Administration grants, was for the first time extended directly to the cities, the great population centres, rather than channelled through the states as was the practice with public health, highway improvement and vocational education federal aids. This set a new pattern in federal-city relations, which was maintained in numerous ways in the war period, notably in the distribution of funds under

the Lanham act to war-congested areas for the construction of urgently needed additional community facilities. It became the basis for the distribution of federal funds for advance public works planning, authorized under the War Mobilization and Reconversion act of 1944, and might well be the basis for the distribution of federal funds for the actual construction of postwar public works, if and when such funds became available. The \$500,000,000 federal aid program of matching grants to state and local governments for construction of some 3,000 new airports and improvement of about 1,600 others in the next 7 years, beginning July 1, 1946, was finally placed on this same basis after a prolonged battle between the municipalities and the states, which desired the grants to be channelled exclusively through them. The act as passed permitted direct dealings with local government sponsors of projects except in states having statutes requiring channelling through state agencies.

During the 1940s, the growing problem of intergovernmental relations was accorded specific recognition by various public and private agencies. In 1943 the Special Committee on Intergovernmental Fiscal Relations appointed by Secretary of the Treasury Henry Morgenthau in 1941 issued its monumental study on *Federal, State and Local Fiscal Relations*. In 1944 Alvin H. Hansen and Harvey S. Perloff published their pioneering study, *State and Local Finance in the National Economy*, and the Commission on Governmental Efficiency and Economy of Baltimore published a study of state-local relations in Maryland. In 1944, 1945 and 1946, the Rhode Island Public Expenditure council issued a continuing series of studies on state-local relationships in that state. Massachusetts in 1945 published the comprehensive report of its Special Commission on Real Estate Taxation and Related Matters, dealing with state-local fiscal relations. Various other states, including New York, Florida, Michigan, Maryland, California and Oregon, undertook comprehensive studies of their state tax structures, with a view to revision of state-local fiscal relationships. In 1944 three major municipal groups—the American Municipal association, the Municipal Finance Officers association and the International City Managers association—all took official cognizance of the need for improved fiscal relations between the federal, state and local governments, and in 1945 a fourth group, the U.S. Conference of Mayors, stressed the importance of the new relationship which had developed between the cities and the federal government. The Council of State Governments established a committee on state-local relations to consider problems raised by the fiscal, functional, legal and other relationships between the localities and the states.

Another noteworthy development in 1945 was the formation of the Pacific Coast Board of Intergovernmental Co-operation, a purely advisory body composed of representatives of the cities of Washington, Oregon and California and of the county, state and federal governments, for the purpose of improving working relationships between the different levels of government concerned with the same groups of people. The board grew out of the Ninth Regional Civilian Defense board set up during the war to meet Pacific coast mutual defense problems.

Finally, mention should be made of the work of the Council on Intergovernmental Relations, founded at Washington in 1941. This group was composed of several federal officials, the executive directors of the American Municipal association, the Council of State Governments and the Institute of Public administration, under the chairmanship of Harold Smith, then budget director of

the United States. With the aid of a grant from the Spelman fund, it inaugurated local programs on a county basis for the purpose of formulating and testing a plan for better co-ordination of governmental services through increased co-operation between the local, state and federal government officers at work in a given county, thus improving and strengthening all government at the grass roots. Early in 1946 four council programs were under way: in Henry county, Ind.; Blue Earth county, Minn.; Colquitt county, Ga., and Santa Clara county, Calif. The council secured the necessary funds and initiated the local program, which was undertaken by local public officials together with interested citizens, assisted by state and federal committees. The local Blue Earth County Council on Intergovernmental Relations issued a progress report on its two-year study in 1945 and the Henry County council reported similarly in 1946. The purpose of these significant projects was to promote fundamental studies looking to the preservation of the vitality of local government and its protection against encroachment by the federal government or the state. In 1946 a comprehensive five-year study of intergovernmental relations in Minnesota was announced, to be undertaken by a group of political scientists of the University of Minnesota, Minneapolis, Minn., headed by Prof. William Anderson. This study was to emphasize such functions of government as public health, welfare, works, education, finance and labour relations, and was to be the most comprehensive of any heretofore attempted.

Impact of the War.—U.S. cities escaped the physical devastation which war brought to the bombed cities of Europe and Asia. The effects of the war were felt mainly in the difficulties experienced in procuring priorities on materials and supplies for the maintenance of municipal services; the loss of employees through the draft and to war industries; municipal salary and wage increases caused by the rapidly rising costs of living; the expansion of community facilities—schools, garbage collection, traffic signals and policing, recreation centres—in “boom” cities; and in some instances “defense depression” caused by curtailment of private industry of a nondefense character, although the defense spending program on the whole had an enormously stimulating effect on the economic life of local communities.

One of the phenomena of the war period was the internal migration of population from the farms—as well as from nonfarm areas—to the war industry centres, chiefly from the rural west, the agricultural south and the north-eastern states to the cities of the Great Lakes, the Gulf coast and southern Atlantic seaboard and the Pacific coast areas. Shipyards and military establishments in some instances brought influxes of population far exceeding the entire prewar population—as at Pascagoula, Miss.; Vallejo, Calif.; Ypsilanti, Mich., where a population of 12,000 had to provide for the 30,000 workers of the Ford bomber plant at Willow Run; and Charlestown, Ind., where a village of 800 increased by 300% in less than 2 years. Metropolitan centres likewise experienced rapid expansion. San Diego, Calif., and Washington, D.C., increased 35% in population from April 1940 to May 1942; and similar increases occurred in the Norfolk, Va., region, Mobile, Ala., Montgomery, Ala., Charleston, S.C., Jacksonville, Fla., Corpus Christi, Tex. and Wichita, Kan. The Detroit, Mich., Chicago, Ill., and Los Angeles, Calif., areas increased by more than 100,000 population each over this period. Dayton, O., and Galveston, Tex., Louisville, Ky., Columbus, Ga., San Antonio, Tex., Johnstown, Pa., and Columbus, S.C., also had large population increases. As

these increases occurred in regions which had been undergoing considerable industrial expansion over the prior two decades, it appeared likely that—barring a postwar depression—these centres would hold a large proportion of their population gains after the war. This situation raised potential problems for the cities of race relations, education, housing, health, sewers and water supply and the future incidence of unemployment relief.

The more immediate problems of critical shortages of housing, schools, transportation, health, recreation and other community facilities were met by the aid of federal funds, beginning with an appropriation of \$150,000,000 in June 1941 under the Lanham act for the construction and equipment of additional municipal public works. It subsequently became necessary to establish a federal Committee for Congested Production Areas (1943) in the executive office of the president to co-ordinate federal activities regarding problems arising out of congestion and to supplement the efforts of the state and local governments in meeting the social and economic problems involved. The committee aided in the handling of priorities, authorizations of plant expansion, of manpower shortages, the hotel situation and child care program development, as well as the provision of additional community facilities, until its abolition at the close of 1944.

Civilian Defense.—Local civilian defense councils were organized in 1941 under the direction of the federal Office of Civilian Defense, of which Mayor Fiorello La Guardia of New York city was the first director. Local defense councils increased from about 1,500 in May 1941 to about 6,000 at the close of the year. Volunteer enlistments increased from less than 1,000,000 in Nov. to an estimated 5,000,000 following the attack on Pearl Harbor. Blackouts and practice air raid drills became customary, particularly in the coastal cities. New York city established a board of disaster control, consisting of representatives of various city agencies dealing with the protection of life, health and property, which worked out comprehensive safety plans; similar agencies were set up in a number of other communities. Mutual aid plans for the extension of water, police, fire and other services between neighbouring municipalities were established in several states. The tire rationing system, under the Office of Price Administration, was operated locally by tire rationing boards designated by local officials in co-operation with the local defense councils. War risk insurance was taken out by many cities through the federally created War Insurance corporation.

As the danger of air raids declined, communities adjusted their civilian defense programs so as to maintain protective services for such emergencies as fires, explosions, floods, major industrial accidents and similar disasters, and to aid in community war services. An outstanding example of the use of the civilian defense organization for disaster relief occurred in the Port Chicago incident in California in 1945, when the explosion of two ammunition ships at a near-by pier caused hundreds of casualties and enormous property loss to an entire community. When the war ended, many of the volunteer groups which sprang up in the war period tended to become permanent municipal institutions. Philadelphia, Pa., instituted a post-war auxiliary police force of 500 men, practically all with experience in the civilian defense organization during the war, to serve in times of emergency or during the staging of special events. Columbus, O., similarly recruited a volunteer police force of 200 members. Civilian defense workers in Tacoma, Wash., reorganized to help in the

United Nations Relief and Rehabilitation administration clothing drive and other postwar activities. Volunteer service bureaus were rendering assistance in various public welfare fields, including veterans' problems, in Seattle, Wash., Denver, Colo., and St. Louis, Mo. In other cities, former defense organizations were turned into permanent disaster agencies. Disaster councils were established in several California cities, and in 1946 the elaborate wartime defense setup in the San Francisco bay area was being reorganized into a disaster corps equipped to deal with earthquake, fire and other emergencies, forming a permanent part of the San Francisco government under an executive officer appointed by the mayor. (See also AIR RAID DEFENSE.)

Employees and Pay Rolls.—Comparable data on the number of nonschool city employees and amount of pay rolls for the years 1940 through 1945 showed that while the number of municipal employees naturally declined during the war years, because of losses to the armed services and to war industries, pay rolls consistently mounted as city after city was obliged to increase its wage and salary rates to meet the competition of industrial workers and to offset the rising cost of living (Table I).

Table I.—U.S. City Employment as of October in Selected Years*

Year	Number of Employees (in thousands)	Amount of Pay rolls (in millions)
1940	887	\$104.9
1941	901	108.4
1942	872	109.7
1943	858	119.3
1944	855	125.0
1945	875	133.0

*Census Bureau: Government Employment, vol. 5, no. 10, July 1946: "City Employment in 1944." Figures could not be carried further back because of revision of its classification by the census bureau in 1944; the earlier figures were adjusted to fit the new classification.

On an index basis of the two-year average 1940-41=100, total city nonschool employment and pay rolls from Oct. 1941 to Oct. 1945 were as follows:

	1941	1942	1943	1944	1945
Number of employees	100	97	95	95	97
Amount of pay roll	101	102	111	116	124

Wage increases were granted on an increasing scale in 1946, while the number of municipal personnel steadily increased.

A significant shift occurred in 1945-46 in the ratio among federal, state and local employees. Federal civil employees decreased by 753,000 persons, whereas state and local government employees increased 314,000 persons following a period of relative stability. This increase reflected a return to prewar status. Total public employment decreased 6.5% over this period; state and local government employees, however, rose from 46% to 55% of the total public employment.

Information on the number of school employees was tabulated by the census bureau for the first time in 1946. The number of nonschool state and local government employees—of which city employees comprise nearly half—as of April 1946 was 2,064,000 (preliminary estimate) compared with 1,881,000 for April 1945. The corresponding figures for school employees were 1,390,000 in 1946 compared with 1,260,000 in 1945. Pay rolls for nonschool employees—of which cities comprised about half—increased from \$253,800,000 in April 1945 to \$294,200,000 (preliminary estimate) in April 1946; and for school employees from \$198,600,000 in 1945 to \$229,800,000 in 1946.

Personnel Training.—In-service training programs by state and local governments helped train some 200,000

public employees in 37 states during the war period. In 1946 these programs were being adapted to peacetime purposes. Most of the in-service training of municipal employees was done under the supervision of state boards for vocational education with the assistance of federal funds authorized under the George-Deen act of 1936. The Municipal Training institute of New York state, for instance, trained many thousands of municipal employees annually with the aid of federal grants under this act.

State leagues of municipalities also initiated training programs, most of which, however, were taken over by the state vocational training program under the George-Deen act. Table II shows the extent of public service training from 1937-38 to 1944-45, when an administrative federal ruling temporarily curtailed the use of funds.

Table II.—U.S. Public Service Training, 1937-45

Year	Number of Trainees
1937-38	None
1938-39	50,723
1939-40	62,303
1940-41	81,784
1941-42	88,707
1942-43	81,264
1943-44	75,575
1944-45	67,663

It will be noted that the peak enrolment was in 1941-42. Enrolments decreased during the war years, when municipal personnel were called into the armed services and war industry, at which time also practically all trade and industrial funds were directed exclusively into training war workers. Firemen and policemen constituted the greater part of the trainees throughout the above period; more than half throughout the nine years were firemen. In 1944-45, trainees included, in addition to firemen and police, school custodians and janitors, school bus drivers, public welfare employees, water and sewage plant operators, municipal administrators and officials, public health employees and hospital attendants, correctional institution officers, conservation officials, finance officers and assessors, power plant operators and inspectors. In July 1945 an administrative ruling prevented the use of George-Deen funds for training other than of a trade or industrial character, which virtually halted all federally aided public service training except for police and firemen. In 1946 federal aid to state and local programs was increased from \$14,000,000 to approximately \$29,000,000 annually.

Many of the larger cities had local programs for the in-service training of their employees. The work of the Bureau of Training of the Civil Service commission in New York city, begun in 1939, and the training program in San Diego county, Calif., were particularly outstanding. An increasing number of colleges and universities were providing training opportunities for municipal employees. While many of these were confined to short courses or institutes, mostly for police and firemen, a few, such as Wayne university, Detroit, Mich., the University of Southern California, Los Angeles, Calif., and New York university, N.Y., offered more varied programs. Two other outstanding organizations in the in-service training field were the Pennsylvania Public Service institute and the North Carolina Institute of Government, at the Universities of Pennsylvania, Philadelphia, Pa., and North Carolina, Chapel Hill, N.C., respectively. The former, financed on a 50-50 matching basis by state and federal funds, trained both state and local employees and had graduated nearly 50,000 employees since its creation in 1938. The North Carolina institute, organized in 1932, specialized in the preparation and distribution of manuals and guidebooks for use by local officials.

In-service training courses in their respective fields were also organized or sponsored by various professional associations, such as the International City Managers association, the Municipal Finance Officers association, the National Association of Assessing Officers, the National Association of Housing Officials, the American Society of Planning Officials and the International Association of Chiefs of Police. A greater amount and variety of training was made available for police and firemen than for any other class of municipal employee.

Under the educational and vocational training provisions of the G.I. Bill of Rights, as amended in 1945, which made federal subsidies available to veterans training on the job as well as those training in schools and colleges, it became possible for a municipality to qualify as a "training institution" and in that way secure assistance in the training of its new personnel. Municipal training programs, including conditions of employment and related instruction, were subject to approval by the Veterans administration. Several cities, notably San Diego, Calif., and Flint, Mich., had begun such training programs by 1946. Because of reported abuses of job training programs in industry throughout the country, congress acted in Aug. 1946 to establish monthly pay ceilings and tighten the standards for all job training projects.

It was thus apparent that a great deal of municipal training activity was in progress in the decade 1937-46. Much of it, however, was scattered and spasmodic and, except for a few states and large cities, on a wholly inadequate scale with regard to the proportion of employees reached. The full possibilities of this phase of municipal enterprise had yet to be realized.

Growth of Municipal Employee Unions.—At the beginning of 1946, employee organizations or unions had been formed in 618 or nearly 60% of the cities of the United States of more than 10,000 population; whereas at the close of 1937 they existed in only 319 or about 33% of such cities. In 1946 there were employee organizations in all 14 of the cities of more than 500,000 population but in only about 40% of those from 10,000 to 25,000 in population. In 1937 they had existed in all 13 of the cities in the more than 500,000 population group but in only about 20% of those from 10,000 to 25,000. In 1946 just over half of the cities of more than 25,000—contrasted with less than 10% of such cities in 1937—had more than 1 local chapter of a national affiliated organization, such as the American Federation of State, County and Municipal Employees (American Federation of Labor), the International Association of Firefighters (A.F. of L.), and the State, County and Municipal Workers of America (Congress of Industrial Organizations). The A.F.S.C.M.E. (A.F. of L.), for example, had 8 locals in Los Angeles, drawn from various city departments; while the S.C.M.W.A. (C.I.O.) had 12 locals in Detroit and 7 in New York. Nonaffiliated groups were operating in 143 cities in 1946, contrasted with 14 cities in 1937. These data are exclusive of skilled municipal workers belonging to their own craft unions and the host of "professional," benevolent, protective and social organizations organized along functional lines, as in police departments or among the nurses. While the tendency was to discourage and even prohibit the formation of police unions, as contrary to public policy, police employee locals were reported as existing in 49 cities as of 1946, 18 having been organized in 1945. These were chapters of the A.F. of L. national organization only, as the C.I.O. had no purely police locals.

The entire field of municipal labour law was thoroughly explored in a major publication, *Labor Unions and Muni-*

cipal Employee Law, by Charles S. Rhyne, published in 1946 by the National Institute of Municipal Law Offices in Washington, D.C. A brief but valuable report of the National Civil Service league, entitled *Employee Organizations in the Public Service*, released originally in Feb. 1946, did much to clarify the atmosphere during the threatened strike of New York city subway employees which was finally averted only through the intervention of C.I.O. President Philip Murray at Mayor William O'Dwyer's request. The right of New York city's transit employees to strike was subsequently rejected as against public policy by the mayor's Advisory Transit committee.

Finances.—The decade was characterized by marked retrenchment in city finances, caused first by the depression and later by the war crises. While it was not possible to present specific consecutive data for all phases of municipal finance, because of changes in coverage and reporting practices of the census bureau's series of financial statistics for cities, the general trends could be clearly traced.

Revenues and expenditures, which had fallen off in the early 1930s, had resumed their upward trend by 1937, but both declined in the aggregate during the war years. Curtailments in outlays for capital improvements, highways and public welfare forced expenditures down; reduced revenues from special assessments because of the curtailed capital improvement program, cessation of the PWA program of federal aid to cities and the lessening of state aid for relief, were the main factors in reducing revenues. Wide variations within individual cities prevailed of course. Expenditures of war industry cities were increased to provide emergency community facilities such as schools, hospitals, utilities, recreation centres and other public needs; while expenditures for police, fire and other protective services increased generally. In 1944 total general revenues were slightly higher than in 1943, but total expenditures were virtually the same.

In 1946, the cities generally found themselves in the best financial condition they had known in many years. In New York state, for instance, it was reported that debts had been sharply reduced from their peak of 1940 back to the 1925 level; the unsound practice of refunding had been everywhere abandoned; tax collections had reached new levels and tax anticipation loans were almost eliminated; the decline in assessed valuations, begun in 1932, had ended; real estate prices were moving sharply upward; about half the municipalities had money on hand to finance postwar improvements. Finally, the uncertainties and inequities of state aid had been eliminated through the new plan of state assistance and related legislation. The gains noted in New York state were representative of the generally improved financial status of cities throughout the country.

This otherwise favourable picture was marred by the realization that the cities were facing greatly increased outlays for expansion of community services in a period of rapidly rising costs of both labour and materials without correspondingly increasing revenues to draw on. The property tax, always the backbone of municipal finances, had reached its maximum return in many cities and was on the decline as a source of revenue. By 1945 and 1946, interest accordingly had centred on the search for new sources. These were found principally in local nonproperty taxes, new or increased service charges and larger shares in state-collected taxes and state and federal grants-in-aid. The utility of local nonproperty taxes was first demonstrated by New York city to meet a financial crisis

in 1934, when it imposed five new local taxes under a temporary grant of authority from the state. Three of these—the sales, gross receipts business and utilities tax—still remained at the end of the decade. In 1938 New York city pioneered again in imposing a municipal cigarette tax, and in 1946 it imposed a pari mutuel tax and a tax on hotel room occupancy. Philadelphia imposed an admissions tax on amusements in 1938 and the first real municipal income or “pay roll” tax in 1939. These examples were followed by other cities, which in turn levied new types of local taxes. The success of the cities in tapping new revenue sources was summarized in an important study, *Where Cities Get Their Money*, published by the Municipal Finance Officers association in 1946. Besides new local taxes, special service charges for such services as garbage and refuse collection and sewage disposal became more widespread. Public utilities were placed on a profit-making basis and were required to contribute either through payments to the general fund or through taxes. Parking meters, a new development after 1935, had been installed in approximately 430 cities by 1945. Of course, not all of these devices were suited to every community, and cities were advised to select those best adapted to their particular social, economic and political environment. The particular value of these local fiscal developments lay in the preservation of local initiative and independence which they helped make possible.

Increased participation by the cities in state-collected taxes and other state and federal aids was also a notable feature of the decade. Because of lack of comparable data, it was not possible to depict long-term trends in shared taxes and grants-in-aid. Many additional states, however, during the period 1941-46, provided either for new or increased shares of state taxes to go to the municipalities or for new or increased grants-in-aid. As of 1945, 42 states were reported as sharing taxes with their municipalities, and 26 as making direct grants-in-aid (*Where Cities Get Their Money*, *supra*). In the opinion of at least one recognized authority on state and local finance, state assistance in the form of shared taxes and direct grants, which in 1945 averaged approximately 16% of the aggregate revenues of cities, could be increased to at least 20% and in many states even to 25% because of the vastly superior revenue sources of the state. Undoubtedly, considerable impetus in this direction was given by the enactment by New York state in 1946 of a radically new municipal finance plan designed to stabilize finances in periods of sharp economic fluctuations. Under the plan, as promulgated by the Moore (state) Commission on Municipal Revenues after two years of research, the revenues from the shared taxes are pooled and distributed on a straight per capita basis of \$6.75, \$3.55 and \$3.00 to the cities, towns and villages, respectively. Reserves were provided to be drawn upon in depression periods and insure continuation of the per capita payments. In addition, state-local welfare services were integrated and the state share of municipal relief expenses, formerly 40%, was stepped up to 80%. On the basis of 1944, the new program of combined shared taxes and direct aids increased state assistance to the localities by more than \$50,000,000 annually. Quarterly payments under the plan began in Aug. 1946. Action by municipalities for increased shares in state-collected taxes were particularly active in many other states in 1946.

Debt.—As of June 30, 1945, the total governmental debt in the United States was \$275,200,000,000, of which federal debt accounted for \$258,700,000,000, state debt for \$2,400,000,000, city debt for \$8,400,000,000 and the other local governments—counties, schools and special districts—for the remaining \$5,700,000,000.

State and local debt, including municipal, which had risen rapidly during the first three decades of the 1900s, remained relatively stable during the depression years but declined during the war years. Thus, city debt—as distinguished from other local debt—decreased only 0.1% from 1932 to 1940; from 1932 to 1945 the decrease was 15.1% and for the period 1940-45 was 15%. The decline for 1944-45 was 2.5%. Short-term debt almost disappeared during the war years. The aggregate city gross debt for selected years from 1932 through 1945 is shown in Table III.

Table III.—U.S. City Debt*
(in millions)

Year	Amount
1945	\$8,411
1944	8,624
1942	9,806
1940	9,899
1937	10,061†
1932	9,909

*U.S. Census Bureau, *Governmental Debt in the United States: 1945*; figure for 1937 from census bureau special study *State and Local Government Debt: 1940*.

†This figure includes township debt, which was not separated in 1937.

The curtailment of capital expenditures—together with the phenomenal rise in national income which resulted in an excess of revenues over expenditures in many cities and the accumulation of reserves for debt retirement and postwar construction, accounted for the wartime reduction in city debt.

Decline in Capital Outlay.—An intensive study of city capital outlay covering the years 1937 through 1943, issued by the census bureau in April 1946 presented comparative data on the general government capital outlay and the capital outlay for city-owned enterprises of the 37 cities with 1940 populations of more than 250,000. The capital outlay of these cities constituted three-fourths of the total capital outlay of all cities with populations of more than 25,000 and so provided a substantial basis for determining trends for cities in the aggregate. The total capital outlay of the cities studied declined approximately 60% from 1937 to 1943. After relatively slight change during the four-year period 1937-40, general government capital outlay was reduced 32% in 1941, 34% in 1942 and 40% in 1943. Omitting New York city, 1937 would have been the peak year for general-government capital outlay, followed by a progressive decline.

Enterprise capital outlay similarly reached its lowest point for the seven-year period in 1943. Unlike general-government outlay, spread over a period of years under a long-range capital program, enterprise capital outlay was usually large and nonrecurrent, and tended to fluctuate sharply from year to year. The activity of a single city therefore radically affected the general trend. The expenditure by New York city, for instance, of more than \$300,000,000 in 1940 for transit unification—which represented a shift in ownership rather than a new “outlay” or investment—increased by 275% the 37-city total for that year; similarly, the individual activity of other cities affected the rate of decline after 1940. Over the period 1937-43, general-government capital outlay

Table IV.—Capital Outlay of U.S. Cities, 1937-43
(in thousands of dollars)

	1937	1938	1939	1940	1941	1942	1943
Aggregate capital outlay	\$373,468	\$357,148	\$376,752	\$731,229	\$306,440	\$216,295	\$148,460
General government capital outlay	225,189	243,538	246,385	241,637	164,277	108,237	64,803
Enterprise capital outlay	143,279	113,610	130,367	489,592	142,163	108,058	83,657

dropped two-thirds while enterprise outlay dropped less than one-half. Expansion in individual enterprises by some cities due to war needs slowed the rate of decline in capital enterprise expenditure.

It will be noted that the ratio between enterprise capital outlay and general-government capital outlay, normally about 1 to 2, changed completely beginning with 1940.

In 1943 capital outlay, both general-government and enterprise, constituted only 3.5% of the total general expenditures of all cities of more than 25,000; in 1944 it comprised but 3%.

New Borrowing.—Figures on the issuance of new long-term debt by all cities of more than 25,000 population showed that the total fell from \$213,000,000 in 1942 to \$104,000,000 in 1943 and to but \$88,000,000 in 1944, in which year more than 70% of such cities issued no new long-term debt at all. The total volume of debt issued in these years, including both original and refunding long-term issues as well as short-term debt, was \$815,000,000, \$751,000,000 and \$644,000,000, respectively. A considerable increase in the volume of new debt, as contrasted with refunding issues, was indicated for 1945 and 1946.

Municipal bond interest yields based on the *Bond Buyer's* index for 20 large municipals fell to an all-time low of 1.29% in March and April of 1946. The high point was 5.52% in Dec. 1933. As of Jan. 1937 the rate was 2.62%.

Table V.—Interest Yields of U.S. Municipal Bonds, 1937–46

Year	Rate	Year	Rate
Jan. 1937	2.62%	Jan. 1942	2.24%
" 1938	3.16	" 1943	2.17
" 1939	2.78	" 1944	1.77
" 1940	2.59	" 1945	1.62
" 1941	2.14	" 1946	1.42

Tax Rates and Collections.—Municipal tax rates tended to increase from 1937 until the United States entered World War II, when a trend toward reduction—except in the larger cities—set in. This trend was reversed, however, in 1944 and 1945, when increases of 12 cents and 22 cents, respectively, per \$1,000 of assessed valuation were noted, practically offsetting the decreases of the two years immediately preceding. An average increase of 21 cents over the 5-year period 1940–45 was reported for all cities of more than 30,000 population. Steadily mounting municipal pay rolls explained the upward trend, which doubtless would be maintained in the years ahead as pay rolls continued their upward climb and greatly increased expenditures for capital programs and maintenance work, deferred during the war, were incurred.

Assessed valuations declined during the prewar years but increased from 1941 on. The increases of 1.1% in 1944 and 1.3% in 1945 were distributed practically equally among cities of all sizes in the more than 30,000 population group; but the average increase over the 5-year period 1940–45 was confined to cities of less than 500,000 population. Cities of more than that population showed either slight decreases or only very small increases. The postwar advance in urban realty values which set in during mid-1945, in the general wake of inflation and construction shortages, was not yet reflected in city assessments of 1946.

The downward trend in tax delinquencies on current levies which commenced in 1934 was persistently maintained. Tax delinquencies rose from a median percentage of 10.15 in 1930 to a peak of 25.35% in 1933. A slow recovery then set in, the greatest gains occurring in 1935 and 1936. In 1937, the median delinquency was 11.3%; by 1944 it had dropped to 3.9% and in 1945 to 3.3%. (Data are from the annual studies of tax delinquency

for cities of more than 50,000 population by Frederick L. Bird of Dun and Bradstreet, Inc.) During this recovery period, the accumulation of taxes in arrears was also substantially reduced. Cities on the average continued to collect a total of current and delinquent taxes in excess of their current levies. The prosperity of the war years revived and extended this period of abnormally high total collections, which had shown signs of decline in the immediate prewar years. The period was also marked by improvements in tax collection administrative methods in many cities. (See also TAXATION.)

Council-Manager Cities.—By mid-1946, 638 cities and 9 counties in the continental United States were operating under the council-manager plan. These included almost 10% of cities from 2,500 to 10,000 population, 20% of cities from 10,000 to 25,000, almost 25% of cities from 25,000 to 50,000, almost 30% of cities from 50,000 to 100,000 and 25% or 23 of the 92 cities of more than 100,000 population, of which Cincinnati, O., (456,000) was the largest. No city of more than 500,000 population was operating under the plan, Cleveland, O., (878,000) having abandoned it in 1930. Of all cities of more than 5,000 population in the United States, more than three-fifths operated under the mayor-council plan; 16% under the commission plan; 17.8% under the council-manager plan; and a few in the New England states under the "town meeting" plan. While the number of adoptions of the manager plan had steadily increased, the rate of increase slowed considerably during the early '30s, reaching a low ebb in 1937. Probably as a result of the intensified interest in the preservation of local self-government that characterized the war period—in contrast to the totalitarian systems so much in evidence abroad—there were more adoptions of the plan in the 5-year period 1941–45 inclusive (119 municipalities) than in any other 5-year period except that immediately following World War I. The early months of 1946 indicated an accentuation of this trend.

Abandonments of the plan by popular vote were relatively few: only 28, including 1 Canadian city, after its inauguration in 1908. There were but 8 abandonments during the years 1937–46, compared with 15 from 1925–37. A major survey and appraisal of the plan in the United States undertaken by the Committee on Public Administration of the Social Science Research Council was published in the following three volumes in 1940: *City Manager Government in the United States*, by Harold A. Stone, Don K. Price and Kathryn H. Stone; *City Manager Government in Nine Cities*, by the same authors; and *City Manager Government in Seven Cities*, by Frederick C. Mosher and others.

Proportional Representation.—Five additional U.S. cities adopted the proportional representation method of electing their legislative bodies during the decade 1937–46. These were: Yonkers, N.Y., 1938; Cambridge, Mass., 1940; Lowell, Mass., 1942; Long Beach, N.Y., 1943; and Coos Bay, Ore., 1944. New York city, which had adopted this method in 1936, held its first P.R. election in 1937, as a result of which the Tammany forces were reduced from an overwhelming majority in the elective governing body to an even half. Boulder, Colo., Cincinnati, Hamilton and Toledo, O., and Wheeling, W. Va. were also P.R. cities, making a total of 11 in the United States. It may be noted that only one city, Ashtabula, O., in 1929, had abandoned P.R. as a result of a direct vote on that issue. It was rejected in Cleveland in 1931, as a part of the

city manager charter which was abandoned at that time. In Sacramento, Calif., P.R. was held unconstitutional by court decision after its initial use in 1921, and in Kalamazoo, Mich., it was likewise invalidated by court decision following its use in 1918 and 1919. Its use by West Hartford, Conn., was curtailed by legislative act—later modified—in 1923. The constitutionality of P.R. was directly upheld in Ohio, Massachusetts and New York.

Civic Activities.—The decade 1937–46 was not a period of notable political activity. There was nothing comparable to the Seabury investigations of New York city which resulted in the reform regime of Mayor La Guardia from 1934 to 1946. Certain substantial gains, however, were recorded. The citizens of Kansas City, Mo., after six years of effort, succeeded in ridding their city of machine domination in 1940. Louisville, Ky., enjoyed an exceptionally sound administration under Mayor Wilson Wyatt (1941–45). A reform administration was unexpectedly swept into office in New Orleans, La., in 1946. At the same time, the period was one of active civic life and citizen participation in government, particularly during the war years.

There was a marked growth in taxpayers' organizations and independent bureaus of research, together with citizens' leagues, research departments of chambers of commerce and other citizen-supported governmental research agencies. These increased by more than 50% in number over the decade and were on a sounder financial basis at the close than at the beginning of the period. Taxpayers' organizations, which began originally with rather naive programs, were coming more and more to grips with central problems of administration and finance. The output of studies in governmental research was of high calibre. The reorganization of the Governmental Research association secretariat, which moved its offices to New York city in 1945, augured well for future developments in the governmental research field.

Housing and Urban Blight.—The establishment of the U.S. Housing authority as a permanent agency in 1937 marked the beginning of public housing as a normal governmental function in the United States. The number of local housing authorities increased from less than 50 in Dec. 1937 to about 500 in 1945. Residential construction in 1941 reached its highest levels since the late '20s. Yet an almost continuous housing crisis in one form or another prevailed during the decade.

The failure to modernize living and community facilities in line with contemporary developments in housing, commerce and transportation created a major problem of urban blight in many of the larger cities, which contributed seriously to their economic decline before the war. This situation is considered more fully below. The war itself resulted in an acute shortage of defense housing in war industry and military centres, which was met largely through enormous federal appropriations for the provision of temporary war housing. A total of more than \$2,000,000,000 of federal funds for publicly financed war housing projects was appropriated in 1941 and 1942. The sudden end of the war in 1945 found the cities totally unprepared to meet the appalling housing situation that confronted them in spite of adequate warning, because of a combination of factors, including the prewar housing shortage, cessation of normal residential building during the war, increase in number of families over the war period, precipitate release of veterans after V-J day and failure on the part of the communities to provide for an obvious postwar need. Thus, in 1946, urban communities were faced with

the problem of providing housing and other services for an urban population estimated at about 114,000,000—or more than 80% of the population of continental United States—on the basis of prewar facilities adequate for not more than 100,000,000. While the problem was recognized as primarily local, as the municipalities had to provide the necessary sites, services, labour and materials, the very magnitude of the situation, affecting as it did the entire national economy, called for federal leadership in setting a national housing goal and stimulating the flow of materials.

The president named Wilson Wyatt, former mayor of Louisville and former president of the American Municipal association, as housing expediter in charge of the national emergency housing program in Dec. 1945. Wyatt also headed the National Housing agency. The federal government acted to effect price adjustments in the field of building materials and instituted premium payments to producers to increase their output, besides providing other remedial measures. A housing goal of 1,200,000 dwelling units to be started in 1946 was set by Wyatt. Some 607,000 had been started by the end of July; the number of permanent units actually completed by that time totalled 194,200, or 287,100 if temporary housing, such as trailers and converted structures, was included. Nonessential construction above certain limits was prohibited by order of the Veterans' Housing Program early in 1946, in order to prevent all new housing construction other than veterans' housing costing less than \$10,000, including site and utilities; new construction of almost all public buildings except by permission of the Civilian Production administration was halted. The cities were called upon to form mayors' emergency committees representative of local government, industry, labour and the public to speed up provision of veterans' housing and to combat inflation. A number of cities, including Chicago, Pittsburgh, San Diego and Philadelphia, undertook to revise and modernize their building codes so as to make available new types of building materials and new techniques. Use of park lands for temporary housing units was authorized in several cities, including Chicago, Los Angeles, Eugene, Ore., and Cincinnati. By Sept. 1946 Chicago and New York had made the greatest progress in providing emergency housing for veterans, with 800 homes already occupied in the former city and 729 in the latter. Less than 75 were occupied in Boston and none in Philadelphia and Detroit. Difficulty in providing sites retarded the program in some cities. Shortages of critical items caused by the black market in building materials, as well as labour difficulties and the curtailment of federal funds for emergency housing in the localities, slowed up the program generally.

Cities were warned by official planning and finance bodies of the need for orderly subdivision control, both within and beyond the corporate city limits, in order to prevent chaotic debt and tax conditions such as had followed World War I. By 1946, 43 states had passed legislation enabling some or all municipalities to adopt subdivision control regulations. Appropriate measures toward this end were adopted in a number of cities. It was pointed out by Wyatt that "today's crisis is just as much a planning emergency as it is a housing emergency." He warned municipalities against locating veterans' housing in existing slum areas or in outside areas requiring the provision of extra schools, utilities and other community services. He advocated revision of zoning ordinances, if necessary, to permit the building of veterans' housing in the better residential districts and the provision of ade-

quate light, air and other health facilities.

Urban blight, occasioned by the migration of the urban population to the outlying suburbs, either within or without the city limits, combined with the movement of business concerns to newer city areas and their establishment of lucrative branches in the suburbs and the failure to modernize the properties left behind, had seriously affected land use and land values, leaving to the central city baffling problems of tax delinquency, reduced valuations and increased debt and tax burdens. The 1940 census revealed the extent of declining populations in the larger cities. A ten-year survey covering the period 1930-40 showed that cities with a declining population had increased their tax rate twice as much as the growing cities, while their assessed valuations had declined to a greater extent. According to one estimate, urban blight had spread to one-fifth of urban United States, covering property assessed at approximately \$40,000,000,000 and involving the welfare of about 50% of the urban population. Studies of specific cities indicated that the cost of blight amounted to from 10% to 20% of their annual budget. The remedy put forward by the National Association of Real Estate Boards was large-scale replanning and rebuilding, with provision of adequate housing.

Urban redevelopment legislation of some type was therefore enacted in about half the states in the period 1941-46. According to the Urban Land Institute, redevelopment legislation was of three types, with some states having two or more types: (1) redevelopment corporation laws, to encourage large private financial institutions to participate in slum clearance through construction of housing projects—passed in 12 states; (2) housing redevelopment laws, enlarging the powers of local housing authorities to make them the development agency, passed in 7 states and introduced in 14 others; here the emphasis was on the low-income group, with the Federal Public Housing authority largely in control of the local housing authorities; and (3) redevelopment land agency laws, establishing new redevelopment agencies controlled entirely by the local government, which could assemble land, issue bonds and sell or lease the land to private enterprise—passed in 12 states. The new Missouri state constitution also authorized cities operating under its constitutional charter to acquire areas for redevelopment.

The earlier legislation fostered the development of the private redevelopment agency, limited to the development of individual projects. Later legislation (1945) favoured the public agency, which would permit redevelopment of individual projects on a much broader scale, in conformity with a comprehensive redevelopment plan. The Stuyvesant Town redevelopment under way in New York city, covering 129 ac. and including more than 12,000 apartments designed to house 40,000 people, was an example of the first type of redevelopment plan mentioned above, while Detroit commenced in 1946 a similar project on a 98-ac. blighted area under the third type of redevelopment listed above, with several individual projects incorporated in the over-all plan. New York city also pioneered in 1946 with plans for the first co-operatively owned redevelopment project—the East River Co-operative apartments—chartered under the state urban redevelopment companies law.

Planning.—Following the early depression years, cities began to realize that some of their economic ills could be ascribed to a wholly inadequate planning concept. The need for specific data on population and population trends, industrial resources and many other social and economic factors, additional to the need for development of

physical facilities such as streets, sewers, parks and other public works, led to greatly enlarged planning activities throughout the nation. The National Resources committee—predecessor of the National Resources Planning board—published in 1937 its significant study, *Our Cities—Their Role in the National Economy*, which was the first attempt to deal with urban conditions on a nation-wide basis. This study was made at the request of a number of national organizations, including the United States Conference of Mayors, the American Municipal association, the American Planning and Civic association and the American Society of Planning Officials. The enormity of the unemployment relief problem in the cities during the early 1930s was one of the factors prompting this undertaking. The recommendations of the committee covered such urban problems as chronically depressed areas, social welfare programs, rehousing of low-income groups, personnel standards and public service training and included proposals for federal aid for public works construction in times of economic stress, a permanent federal public works authority, federal aid to state, regional and local planning agencies by a permanent federal planning board, a federal study of conflicting intergovernmental fiscal relations between the local, state and federal governments, and legislation permitting the handling of urban problems such as health, welfare, planning, public utilities and so on, on a regional basis in metropolitan areas extending beyond state lines.

While some of the objectives of the committee were dealt with piecemeal through various federal channels and agencies, the failure to create a permanent federal planning organization after the liquidation by the congress of the National Resources Planning board in June 1943 retarded planning progress in the United States and prevented developments as comprehensive in scope as those envisaged, for example, by the famous Uthwatt committee report in England (1942) on land control, compensation and rebuilding (*Report of the Expert Committee on Compensation and Betterment*).

Local planning developments over the intervening years included the provision of better facilities for the training of planners, notably at the University of Buffalo, N.Y., Harvard and Western Reserve university, Cleveland, O., and the marked expansion of the scope of city planning. The New York State Planning council in 1938 published a major study of the disastrous effects on local government finances of the premature subdivision of land for urban purposes in outlying metropolitan areas (*Premature Subdivision and Its Consequences* by Philip H. Cornick of the Institute of Public Administration, New York city), which resulted in legislation in that state for the better regulation of subdivision platting activities. In the same year, New York city's radical new charter with its provision for greatly enlarged planning powers in the City Planning commission took effect. Other cities with outstanding planning agencies—to mention but a few—included Baltimore, Chicago, Los Angeles, Detroit, Pittsburgh, Philadelphia, Cleveland and San Francisco. During the war years, local planning bodies were actively concerned with actual war problems and with the preparation of postwar plans. Considerable federal assistance was given to the state and local governments in the preparation of postwar long-range public improvement programs; the National Resources Planning board published in 1941 its helpful *Long-Range Programming of Municipal Public Works*. There was increased dependence on regional rather than municipi-

230 pal planning in connection with such wartime needs as evacuation programs, traffic relief and transportation plans, war housing and postwar planning. The regional planning committee of the Detroit defense area, for instance, represented ten cities. Louisville and Milwaukee, Wis., besides many other cities, similarly inaugurated regional planning developments.

In 1946, according to a survey covering 700 cities, cities were spending about 50% more for municipal planning than in 1945; more than 86% of the reporting cities of more than 25,000 population had either official or unofficial planning agencies, whereas 30% of the cities in the 10,000-25,000 population group had no planning agencies.

In spite of oft-repeated warnings regarding the involved traffic conditions in all urban areas which the return of automobile production would bring, no new or practical solutions to alleviate parking and traffic problems appeared during this period.

Postwar Programs.—During the war years, public works construction except when necessitated as part of the war effort, came practically to a standstill. Communities were urged, however, to accumulate financial reserves and to prepare plans for the postwar period when, with the expected availability of manpower and materials, public works construction might be utilized to offset possible widespread unemployment. But the housing emergency at the war's end postponed almost all construction not related to housing needs. Meanwhile, state and local governments had proceeded more or less unevenly with the preparation of postwar plans. One of the biggest deterrents to adequate local planning was the lack of a federal policy after the demise of the National Resources Planning board, as to whether or not to provide public funds to assist the local planning agencies. Appropriations were finally voted in 1945—\$17,500,000 in May and \$12,500,000 in Dec.—on a quite inadequate scale. By May 1946 all but \$2,000,000 of these funds had been advanced to state and local agencies, and the allocation for advances in 22 states was completely exhausted. An additional \$35,000,000 was accordingly appropriated in June 1946 to be available until June 30, 1947.

The most comprehensive review of the status of state and local postwar planning was presented in the Dec. 31, 1945, semiannual report of the Bureau of Community Facilities of the Federal Works agency, submitted in March 1946. By the end of 1945, applications for advances amounting to \$13,200,000—representing public works with an estimated total cost of \$564,000,000—had been approved. More than 70% of the construction costs for which planning advances were approved were for sewer and water facilities, school and educational facilities and hospitals—all projects vital to the development of an expanded housing program.

The bureau found that in addition to federally-assisted planning, the states and localities reported completed plans for public works with an estimated total cost of \$961,000,000. It was estimated that funds were on hand or arranged for to cover 45% of this total cost. Nearly one-half of such proposed public works, in terms of construction costs, however, were concentrated in New York state alone, with New York city accounting for 40%. Plans in the design stage amounted to \$4,404,000,000 in estimated total costs. Again, these were concentrated largely in a few states, and in many instances had not progressed very far. Some doubtless would not be completed without federal aid.

The most satisfactory progress reported was in the planning and construction of roads and highways under the federal-aid highway program.

The survey indicated on the whole considerable unevenness in the extent of postwar plan preparation. A disturbing number of communities had no plans either in the completed or design stage, and the volume of completed plans was far below construction requirements of the next few years. It became clear that local governments, particularly the smaller communities, would not prepare development plans for public works without state or federal stimulation, aid and supervision.

It should be noted that while a federal-aid program of advances (*i.e.*, loans, not grants) for state and local planning was authorized in 1944 and was under way in 1946, no federal program of either loans or grants to such governments for miscellaneous construction purposes—exclusive of specific measures for highways, hospitals and airports—had been adopted by mid-1946. This policy accorded with the view that federal aid, other than planning advances, should not be extended for miscellaneous public works of purely local importance unless the development of highly adverse economic conditions should warrant it.

Airports.—The postwar years brought considerable activity in municipal airport planning, in anticipation of vastly expanded postwar air line needs. The federal aid program for airport construction enacted in 1946 would doubtless greatly accelerate municipal activity in this field. But the full effects of greatly increased air travel would not in all likelihood be felt for at least another ten years. Meanwhile, much remained to be done by the municipalities to place this developing function on a stable basis. A study of 51 selected airports by the Harvard Business school in 1946 showed a deplorable condition in municipal airport finance. As far as records were available, it appeared that only one airport was covering full costs, including interest and depreciation, while the total revenue of airports studied showed a representative ratio of only 2% to total investment. Airports, financially, were anything but going concerns. Cities were endeavouring to meet the situation through the development of nonaviation concessions, such as restaurants, spectator ramps and other enterprises, as well as by raising the landing or service fees for plane operators.

As a result of a survey of the Newark, N.J., airport by the bistate port of New York authority in 1946, followed by a request to the authority for a similar study of New York city's airports, an integration of airport facilities in the greater New York and northern New Jersey area appeared likely.

Cities and the Atomic Bomb.—The advent of the era of atomic warfare raised the question of the vulnerability of the modern concentrated city in the atomic age. Though the atomic bomb took the spotlight of attention in U.S. headlines, military leaders generally agreed that controlled missiles, synthetic poisons and other developments were even more significant than atomic bombs for cities and congested populations in the event of future war. The wreckage of the cities of the world and the far greater effectiveness of new weapons developed but not used in World War II thus raised a series of new problems at a time when cities had not yet learned how to meet the changes arising from the automobile, not to mention the changes still to be made to meet the demands of air transportation, air conditioning and a host of other technical developments.

As to safety from atomic bombs, there was no disagreement that the ideal solution lay in an effective world or-

ganization for the control of atomic warfare and of the new flying missiles, if not of warfare itself. However, a national policy of planned decentralization of U.S. cities into separated urban areas of some 50,000 population and the permanent scattering of industries was suggested as a secondary solution, not solely as a defense measure against the bomb, but as a defense measure also against the growing evils of urban blight and traffic congestion. Such an idea had its precedent in the garden city proposals of the English planner, Sir Ebenezer Howard—a new edition of whose 40-year-old classic, *Garden Cities of Tomorrow*, appeared in the United States in 1946—and was embodied in the Abercrombie Greater London plan, accepted officially by the British government. One argument for this view was that the atomic age had simply precipitated a change in scientific city planning which the spread of urban decay had already necessitated.

Though not designed specifically to meet the threats of atomic warfare, the Boston Prize plan of 1944 gave striking publicity to a program for federating the independent municipalities of the Boston area, giving a local self-governing basis to the existing state metropolitan agencies and organizing, equipping and financing a new decentralization of population and industry within the framework of the federated metropolitan government. After Hiroshima, this plan was defended by its proponents as a method of meeting the threat of atomic warfare.

In spite of these discussions and plans there were no evidences of action in the United States through 1946 looking toward the organized decentralization of industry or population for strategic or other reasons.

(A. M. Ds.; L. Gu.)

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Great Britain

At the outset of the period 1937–46, the framework of municipal government in Great Britain had reached what appeared to be a condition of stability following the reforms and readjustments of poor law and other services under the two Local Government acts of 1929 (one for England and Wales and one for Scotland). The modified system had settled down into fair running order. The experiment of making, in place of some of the numerous separate grants, a general exchequer contribution for municipal services generally, and its apportionment among local authorities as a block grant, had become an integral part of the finances of municipal government. The Local Government act, 1933, had redefined the constitution and general powers of the various types of directly elected local authorities in England and Wales, and a similar redefinition in respect of London local authorities was enacted in the London Government act, 1939.

At the opening of the decade, certain trends which later became more pronounced were already evident. Signs of the events of the ensuing years were beginning to emerge. One important trend was the transfer of functions from local authorities to the central government. The transfer in 1934 of the able-bodied unemployed from the ambit of local poor law administration and in 1940 the payment of supplements to old age pensions to the national assistance board provided examples of this. Another trend, some-

what akin to this, was demonstrated in 1938 by the Fire Brigades act, which empowered local fire brigade authorities to combine for mutual aid, thus giving expression to the idea of organizing local services on a regional basis.

The recognition of the need for national physical reconstruction was evident in the numerous town-planning schemes then in draft or in early stages of application. A great slum clearance drive, under the guidance and encouragement of the central government, was being undertaken by local authorities throughout Great Britain.

But World War II intervened, and the years which should have seen the end of slums and overcrowding in Great Britain saw devastation from aerial bombardment in many of the chief urban centres of the country. The experience gained in those prewar housing operations was not lost, however, for it later helped the authorities, both national and local, to frame plans and programs for the great drive toward postwar reconstruction.

Before 1937, the municipalities were made officially aware of the danger of war, for the government in 1935 had sent them a directive on the subject of air raid precautions. With the Munich crisis in 1938, activity on general civil defense preparations became intense. The central government instructed the municipalities to put aside their housing and other developments, and to give first priority to the preparation of schemes of protection against air attack.

Local Government in War: Civilian Defense.—The impact of World War II upon the activities of local authorities was profound. Capital works such as schemes for new housing, for educational expansion and road improvements were virtually brought to a standstill by order of the government, which at the same time placed on local authorities the new and heavy responsibility of providing various civil defense services. These war duties, however, did not suspend all the normal functions of local authorities. The public health, education, public assistance and other services had to go on, under the difficulties of war conditions, side by side with special war activities.

These wartime activities were directed towards safeguarding and assisting the civil population, and included the building of public air raid shelters; the organization of local ambulance services; the provision of rest centres and billets for persons rendered homeless by bombing; the administration of rescue services to extricate persons from damaged buildings; the removal of debris and dangerous buildings; the co-operation in an emergency hospitals service by which hospital resources were pooled to meet the needs of war; the schemes for evacuating from vulnerable areas children, mothers, elderly and blind people to places of greater safety; the distribution of gas masks (which fortunately were never used); the provision of allotments for food growing and the establishment of local fire guards and firewatchers. The local fire brigades, greatly expanded to meet war needs, were also the responsibility of local authorities until 1941, when the brigades were amalgamated and transferred to the national fire service.

In addition, local authorities were active in the local arrangements for the distribution of food and fuel and the repair of war damage, and may be said to have assumed the role of protectors, guides and advisers to the civil population. The ordinary citizen who, in prewar days, was prone to look upon his local council as a rate-collecting body, to be grumbled at or even ignored, so long as the public services were maintained, came in wartime to turn increasingly to the town hall and the county hall for ad-

232 vice and assistance on the many and novel features of wartime existence. Most local authorities set up local information centres for the special purpose of dealing with the numerous inquiries from the general public.

The cost of the civil defense services was very largely reimbursed by the central government. The cessation or slowing down of normal activities led to a reduction in expenditure on their provision which in some areas more than counterbalanced the net cost of their wartime functions. As, however, the results of evacuation of people and businesses, especially from the evacuation and defense areas, manifested themselves, and properties were destroyed by bombing and thereupon ceased to be ratable, the loss of rate income was such that in many cases special financial assistance from the government was necessary. In other areas the development or the establishment of war industries led to a marked growth in ratable value.

The method by which the civil defense services were co-ordinated was unusual in British tradition. The country was divided into large civil defense regions, comprising the areas of several counties and embracing a number of municipalities. For each of these regions a civil defense commissioner was appointed by the central government, to which he was responsible. But this radical departure from normal democratic practice went no further. For although the civil defense commissioners co-ordinated, guided and to some extent controlled the operation of the civil defense services, with the exception of the national fire service after 1941, the provision and administration of the services was left in the hands of the separate councils themselves, who also carried on their normal peacetime services free from interference. In this way the democratic element of British local government was preserved. With the cessation of civil defense activities, the office of the civil defense commissioners came to an end.

Within the domestic organization of the local authorities themselves, there was also a temporary departure from accepted practice. At the outbreak of the war, many local authorities curtailed their normal procedure and set up emergency committees of a few members with power to carry on all the work of the councils. Control was thus concentrated in the hands of a few. But these arrangements, made under the stress of emergency and uncertainty, to meet the unknown dangers of air raid or invasion, were accepted only for so long as necessity required. It seemed clear from these experiences that, although a certain curtailment of normal democratic methods of control by elected representatives might be inescapable in circumstances of special danger and difficulty, the British temperament would not suffer such for longer than was absolutely essential. (See also AIR RAID DEFENSE.)

Growth of Public Interest.—During the ten years 1937–46, and notably in the last two, there was a great swing to the left in British local government. The Labour-Socialist movement gained ground in almost every area where contests for local elections were run on political lines. This was in some measure due to a growing appreciation of the fact that upon the extent and quality of municipal services the health, comfort and well-being of the local community largely depended.

However, this undoubted growth of popular interest in local government activities was not reflected in the percentage of persons voting in the municipal elections in Great Britain in 1945 and 1946, which generally was very low and in some areas the lowest on record. Small polls were the rule after the war of 1914–18. One explanation

might be that at such times the public mind was focused on the wider national and international issues, and attention to local matters diminished correspondingly. The low percentage of votes cast at these times did not necessarily mean a permanent lessening of public interest in municipal affairs. In fact, the public awareness of the importance of municipal services was never more alert and active than during the six years to 1946. The experiences of war brought to light many deficiencies and shortcomings and gave a powerful stimulus for improvement and enlargement. Thus in Great Britain, when hostilities ceased, a general desire had crystallized for improved educational facilities; for effective replanning of towns and cities and the preservation of beauty in the countryside; for better housing of the people generally and for enlarged public health services for all. Indifference to these needs was replaced by active and clamant demand.

Structural Adjustment.—During the decade 1937–46, technical developments in many fields, such as modern transport and communications, and the inequalities of financial resources and equipment in many areas, combined with wartime experience, demonstrated the need for larger areas of administration. To some observers a complete recasting of the territorial basis of local government seemed to be called for. By the act of 1944, public education was reorganized on a broader basis than before the war. In 1945 a local government boundary commission was appointed by the government with power to review and adjust, on an empirical basis, the areas and status of local authorities as conditions required.

Thus, the decade was a period of change and challenge for British local government, during which it faced and surmounted the greatest difficulties in its history. Much was learned from these eventful and formative years, from which would emerge gradually, as befitted British tradition, new units of administration more appropriate to modern requirements, but in which would be preserved the vital principle of elected representatives, publicly responsible.

Continental Europe

On the continent of Europe the years from 1937–46 saw a marked decline in democratic local government. In the totalitarian countries it had virtually disappeared before World War II, while in the occupied territories it was permitted to function only as the invader prescribed. The experience of dictatorship and invasion led to a great awakening of the belief in democracy, especially in the management of local affairs, which was seen to be one of the cornerstones of the structure of free government of the people by the people. In the liberated countries, a passionate interest in the British municipal way of life had shown itself; in the axis countries, the first approach to the re-establishment of representative government had been through the creation of elected local government authorities. At the close of the decade the world picture was one of growing interest in municipal services as an essential element in advancing civilized life, with a resurgence of faith in the principle of democratic local government. (See also HOUSING; TOWN AND REGIONAL PLANNING.)

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Munitions of War

In the ten eventful years, 1937-46 inclusive, the trend in new production of the tools of war was toward greater mobility and greater striking power. Those two principles were carried out even in dealing with the human elements of war, wherein the United States, for example, substituted the flexible "triangular" form of divisional organization for the former "square" type of organization. The objective was to so organize and arm as to be able to strike quickly and hard.

Army munitions fall roughly into three broad classes: (1) artillery; (2) small arms; (3) ammunitions. Each has many ramifications. A consideration of the first, artillery, admits of the following broad lines of classification: horse-drawn, pack, truck-drawn, self-propelled, railway, coast defense, aircraft and anti-aircraft.

Artillery.—By calibres, artillery fell into three broad classes during World War II: (1) light, pieces up to and including 105-mm. howitzer; (2) medium, 155-mm. howitzer and 4.5-in. gun; (3) heavy, 155 mm. gun, 8-in. and 240-mm. howitzer, plus seacoast artillery ranging from 8-in. to 16-in., the latter frequently railway-mounted in open terrain.

Anti-aircraft Artillery.—Just before World War II, anti-aircraft weapons were 3-in. guns, along with .30- and .50-calibre machine guns on pedestal mounts, limited to 67° elevation. More powerful and far reaching weapons developed later, among them the .50-calibre machine gun on single and multiple mounts permitting fire up to 90° elevation at the rate of 800 rounds per minute; the .37-mm. and .40-mm. rapid-fire anti-aircraft guns; the 90-mm. gun mounted on a single-axle, dual-wheel carriage, and the "stratosphere" gun, 120-mm., firing 11 mi. into the air (it could also be depressed and used on ground targets). The auxiliaries of anti-aircraft firing kept pace with weapon developments. Searchlights with their accompanying power plants were developed so as to stab searching beams of light to great distances in the skies to spot raiding planes; sound detectors and the latest radar developments helped to localize the flying targets; control stations were developed to the point where all data necessary to aiming the gun and setting the fuse were calculated speedily and automatically. However, splendid as the records of these anti-aircraft weapons were in World War II, it was doubtful if they would play any decisive part in wars of the future. Devastating rockets guided by remote control plus supersonic aircraft, capable of terrific speeds, would, it was believed, render the anti-aircraft guns of World War II obsolete.

Aircraft Artillery.—When artillery went "upstairs" and became part of aeroplane armament, the 20-mm. cannon was, for a considerable time, the standard heavy gun of the plane. It was supplemented by one or more .30-calibre machine guns per plane. As plane types were improved and more and heavier bombing planes (e.g., the U.S. Mitchell bomber) came into use, a 75-mm. cannon was mounted to fire from the nose. Initially, gun mounts in aeroplanes were fixed, but these were rapidly replaced by flexible mounts affording a wide field of fire. By synchronization, weapons fired their missiles through the whirling blades of the propeller, and, in the B-29s, all defense guns of the plane could be controlled and fired, if necessary, from a single central control room in the plane.

Coast Defense Artillery.—In terms of modern warfare, this tremendously heavy-calibre artillery became nearly worthless. In World War II, heavy guns along the Dover coast of England and the Calais coast of France banged away at each other. But German robombs launched from France found their targets in industrial England with no interference from seacoast artillery. A fixed emplacement such as was necessary for these big, immobile guns was a particularly easy target for a plane to strike from the rear. The invasion of the Cherbourg peninsula was not made under protection of heavy seacoast artillery firing from the rear but under an umbrella of aeroplane support from the sky and heavy, destructive fire from naval units brought close in.

Field Artillery.—The next item of consideration is, of course, the artillery fighting with the ground troops in the field. In this connection it must be remembered that during World War II the air force fought with the ground forces; low-flying bombers which strafed enemy ground, aiming to take out distant targets were, in effect, long-range artillery supporting ground force action. In Sicily, even navy artillery stood in close to blast enemy forces from roads which Allied troops needed to use. However, what follows here will be a brief discussion of artillery as it is popularly known in ground operations.

In the early years of World War II, Germany enjoyed an unquestioned superiority in artillery weapons. The German attacks through the Low Countries were spearheaded by mechanized artillery which rolled up all opposition. Striking power of tremendous force was achieved by modernization and mechanization of previously existing types of weapons and by the development of previously unknown types. Artillery which could be mechanically towed or which was capable of self-propulsion was the only thing that counted after the German disclosed his hand. Against the battering force of the German howitzers, ordinary fortifications crumbled—the famed Maginot line disappeared as an impregnable barrier almost as though it had been a myth.

As the decade 1937-46 began, the tendency of all nations was to attach more and more artillery pieces to infantry regimental strength. In 1937-38, soviet regiments included 81 light machine guns, 60 heavy machine guns, 27 grenade throwers, 6 cannon (37-mm.), 6 regimental cannon (76-mm.) and 2 anti-aircraft guns. Italian regiments included 4 pieces of pack artillery and 65 17-mm. cannon. U.S. regiments carried 72 light machine guns, 36 heavy machine guns, and 36 light mortars.

From 1940 onward it was evident that complete mechanization of the artillery arm was a necessity. Eventually, even huge guns like the 155-mm. "Long Tom" of the closing year of the war were so built as to be broken down into easily handled, quickly transportable units.

On the ground, field artillery mechanization was achieved rapidly. Prime movers with full or half-track traction hauled the huge guns into position; many of the heavier pieces were full mounted on tank chassis to achieve complete self-propulsion; smaller pieces like the 37-mm. anti-tank gun were mounted on pneumatic-tired carriages for quick shifting into and out of positions.

Along with the step-up in mobility came improvement in design, increase in calibres, higher muzzle velocities, greater destructive striking force. In the United States, by 1941, field artillery units included 75-mm. guns and howitzers and 105-mm. howitzers; corps artillery had 155-mm. guns and howitzers. A new 4.5-in., destructive in its

use against tanks, was successfully used in 1941. The 105-mm. howitzer was supplanting the famous World War I 75-mm. weapon.

Early in 1942, Britain began replacing its old 18-pounder (83.7-mm.) field guns with 25-pounder 88-mm. calibres. Russia had all its 115-mm. field guns on motor carriages, and also had its big 8-in. howitzer built to be transportable in 2 loads—the carriage on a broad caterpillar track; the tube on a 6-wheeled carriage, both drawn by a caterpillar tractor on which the crew rode. Russian field artillery calibres in this year were 76.2-mm.; 107-mm.; 122-mm.; and 152-mm.

U.S. field artillery units became armoured units with self-propelled 105-mm. howitzers mounted on medium tank chassis, and supplemented by .50-calibre machine guns.

In 1942, Japan used lightweight rocket cannon for the first time in its siege of Singapore.

One U.S. artillery weapon was a standout in 1943—the 4.2-in. chemical mortar. It was a rifled weapon with a 2-mi. range and was used for just about every type of destruction expected usually from much heavier artillery.

In this year, too, the U.S. army brought out the M-10, a weapon designed as a tank destroyer. It was, in effect, a land cruiser capable of coping with anything in battle. Another heavy antitank weapon was the M-12, a 155-mm. gun mounted on a medium tank chassis. In the North African campaigns of 1943, Allied self-propelled weapons brought down axis planes and broke up German communication lines.

The year 1944 brought out the powerful 76-mm. gun. Mounted on an M-4 medium tank chassis, it was a decided improvement over the 75-mm. in muzzle velocity, range and penetration. It was used at once in U.S. aeroplanes. That year also showed that the term "pack artillery" had acquired a new significance. Originally, it applied to the type of artillery which could be disassembled and assembled for mule or horse transport in mountainous regions. But now the paratrooper was concerned with the number of packs his weapons could be broken down into so that they could accompany him as he dropped from the skies onto enemy terrain. One of the efficient weapons in this class was the .75-calibre pack howitzer which could be dropped from the skies in 7 loads and could reach action in 7 minutes after the crew and parts left the plane. The heavy weapons of that year were the 8-in. gun and the 240-mm. howitzer, both highly mobile. The 8-in. was familiarly known as the "Black Panther."

In the closing year of the war, 3 new artillery pieces were put into the field by the Allies, the 155-mm. howitzer, motor carriage M-41; the 8-in. howitzer, motor carriage T-89; and the 155-mm. gun, motor carriage M-40. All were extremely mobile, and their addition increased firepower of ground forces.

Tanks.—The problem of tank building in 1937-38 presented two items, armour and speed. Ordinary 37-mm. thick armour would not stop infantry cannon shell. Speeds were, accordingly, revised downward and armour was thickened. Tank armament at this time was usually one 37-mm. cannon and one or more machine guns per tank. There was considerable experimentation with Diesel power plants. France and the U.S.S.R. were building tanks up to 70 tons, but they were purely experimental since the early tendency was toward standardizing on a light tank of 8 to 9 tons, and a heavier tank, not over 15 tons. The large tanks were to mount guns up to 4- and 6-in. calibres. The Spanish Civil War afforded a testing ground for tanks.

The principal types were the German light tank, the Spanish light (Trubia), the Italian tankette, the French Renault, the Russian light (T-26) and the Russian medium (T-28). The German type weighed $5\frac{1}{2}$ tons, mounted 2 machine guns and had a speed of 30 m.p.h. The Italian weighed 3.6 tons, mounted 1 or 2 machine guns, and had a speed of 27 m.p.h. The Russian types ranged in weight from 7 to 19 tons, with speeds up to 40 m.p.h. Their largest tank mounted a 45-mm. cannon and 3 machine guns.

By 1940, tanks were classified in 3 general groups: accompanying tanks, light, 10 tons, 5 to 6 m.p.h. speed, 37-mm. cannon armament, armoured to resist infantry weapons but not antitank cannon; leading tanks, 15 to 17 tons, speed 5 m.p.h., 47-mm. cannon and 2 machine guns armament, and carrying short-wave radio; and special mission tanks, heavy, to attack antitank batteries and hostile tanks, 20 to 30 tons, speed very slow, 75-mm. and 155-mm. armament, armoured $1\frac{3}{4}$ to $2\frac{1}{2}$ in. thick. This latter type could withstand shell from 75-mm. field guns but their lack of speed and great weight seriously limited their use.

The following year emphasized the value of the medium tank—25 to 30 tons, 30 m.p.h., 75-mm. gun, 37-mm. gun and machine gun armament. It proved far better in desert warfare. German tanks of this period halted to fire; U.S. tanks, fitted with superior fire-control equipment, fired effectively while in motion. Two structural changes were emphasized for desert fighting: substitution of air-cooled for liquid-cooled engines and substitution of moulded rubber treads for steel caterpillar treads.

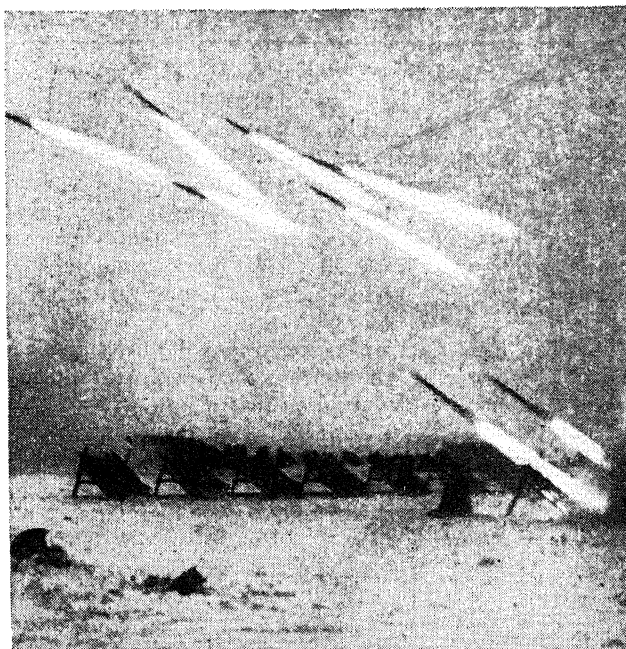
German Field Marshal Erwin Rommel used a Mark IV tank in his 1942 campaigns in Africa. It weighed 22 tons, had a speed of 22 m.p.h., and was armed either with a short 75-mm. cannon or with high velocity 50-mm. guns. However, this tank could be knocked out by the U.S. General Grant tank and was much inferior to the later General Sherman tank of the U.S. army. Since Rommel depressed the 88-mm. anti-aircraft gun and used it against the U.S. tanks, the commanders of these units were forced to outmanoeuvre him to avoid destruction. In this same period, Japan was using tankettes, 3 to 4 tons; light tanks, 5 to 7.7 tons; medium tanks, 15 tons; and heavy tanks, 35 to 36 tons.

By 1943, the United States led the world in tank production—as high as 5,000 in 2 months. During 1944, the U.S. Sherman tank mounted the new 76-mm. cannon, noted for its great muzzle velocity. Some Shermans mounted 105-mm. howitzers.

In the last year of active operations, the British used a 95-mm. howitzer as a part of tank armament, firing high velocity shells. The U.S. army perfected the 43-ton M-26 General Pershing tank with a long-barrelled 90-mm. gun firing a shell with a muzzle velocity of 3,750 ft. per second, capable of penetrating 14 in. of armour at 300 yd.

Antitank Weapons.—This classification moved throughout the ten eventful years from the lightly armoured cars of 1937-38 to the smashing, self-propelled giants of 1945. The problem of beating the tanks was first approached by developing "tank chasers," later known as "tank destroyers," and "tank traps." The original tank chasers were lightly armoured cars of high manoeuvrability carrying 42-mm. guns capable of penetrating tank walls. In 1939, the development of the tank and of the defense against it kept about even. In armament of antitank weapons, there were used the Hotchkiss 13-mm. and 25-mm.; the Oerlikon (Swiss) 20-mm.; the Rheinmetall (German) 37-mm.; the Bofors (Swedish) 40-mm.; and the 65-mm. anti-aircraft cannon of the Italians, the latter depressed to ground level.

Recognizing the necessity for meeting the challenge of



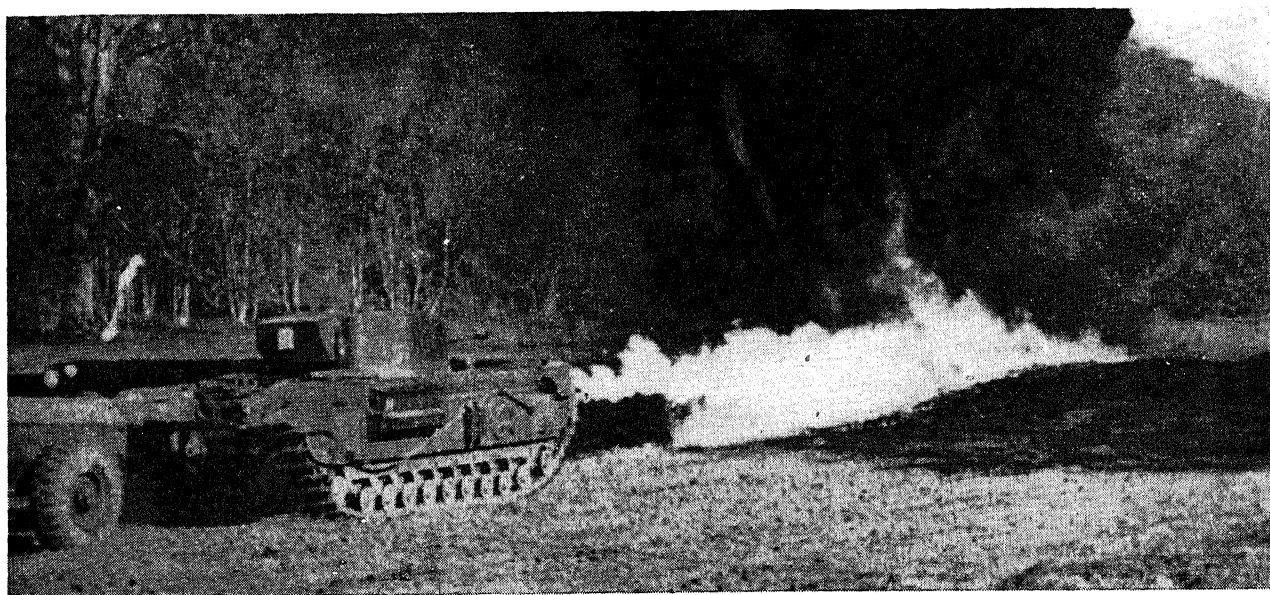
Above, left: U.S. mobile 155-mm. gun, mounted on a medium-tank chassis. Throwing a 95-lb. shell ten miles, it could knock out any tank in existence

Above, right: "Katiushas," Russian rocket guns shown ranged in batteries as they fired at the Germans before Stalingrad



Left: The M18, new 57 mm. recoilless rifle provided for U.S. infantrymen in 1945. It had the striking power of field artillery and could be handled by one man

Below: The "Crocodile," a British flame-throwing tank with a range of more than 150 yards, was first used against the Germans in France in 1944. It was fitted to a Churchill tank and carried its fuel in an armoured trailer towed by the tank



tanks, the United States, during 1940-41, developed 52 tank destroyer battalions, equipped as: (1) light units with towed weapons assigned to infantry divisions, (2) light units with self-propelled units, usually assigned to cavalry and motorized divisions and (3) heavy units assigned to armoured divisions, army corps and armies. One of these destroyer battalions was mounted on half-tracks and carried 75-mm. guns. Also used against heavy tanks were 18 jeeps and "swamp buggies" along with 10 converted light tanks.

By 1942, the United States led in tank destroyer production. The best unit was built on the General Grant medium tank chassis. This weapon played a decisive part in African operations, knocking out Rommel's 88-mm. anti-aircraft guns. U.S. manufacture also mounted heavier-calibre destroyers on caterpillar half-tracks, 37-mm.; also, all-wheeled Fargo tracks armed with 75-mm., 3-in. high velocity types, and a 105-mm. mount. Germany claimed a 47-mm., self-propelled antitank weapon. However, their 28/20-mm. antitank gun, used in Africa, was an excellent weapon, achieving great penetration for its .80-calibre shell.

In the closing years of the war, the United States brought out 2 very proficient tank destroyers—the M-12, mounting a 155-mm. gun on a medium tank chassis and a 105-mm. howitzer mounted on an M-7 tank chassis.

Other Allied Types.—To the field and siege guns, tanks and antitanks of artillery must be added the mortar. This weapon, shorter, lighter and more mobile than howitzers (with the exception of "Little David") was either smooth-bore or rifled. Trench mortars were used against troops in trenches and foxholes, against machine gun nests, and against road blocks. They could be used for plunging fire to as high an angle as 85°. After 1941, the trend was toward larger calibres. The principal trench mortar types developed were the smooth-bore 60-mm. and 81-mm. The best rifled-bore was the 4.2-in. chemical mortar; for the United States, the Stokes mortar was the best. Almost at the end of the war, the U.S. army developed "Little David," the epitome in mortar construction; this 914-mm. (36¼-in.) giant fired a 3,650-lb. shell a distance of 6 mi. through a 22-ft. muzzle-loading rifled tube. During 1946, there was under test a small mortar, unique in that its loading was accomplished with the assistance of a rocket attached to the nose of the shell. When lit, this rocket drove the shell back from the muzzle to the breech of the mortar to make contact with the firing pin.

Rocket ammunition, or rockets, made rocket launchers necessary. They were of two types—guide rails and guide tubes. Both were fitted with electrical ignition devices to set the rocket in motion and give its flight initial guidance. Rocket launchers were of single and multiple types, stationary or mobile. In the latter case, banks of launchers were mounted on trucks, on aircraft, on tanks and on landing craft covering beach landings.

Axis artillery types opposed to the above weapons follow in brief summary.

German Artillery Weapons.—Howitzers: Light—10.5-cm. (two types); 7.5-cm. (close support infantry weapon); Medium—15-cm. (replaced after 1939 as obsolete); Heavy—15-cm. (high or low trajectory firing); 21-cm. standard weapon; Mountain—7.5-cm. (original Skoda design); 10.5-cm. (improvement upon standard piece of same calibre).

Railway Guns: "Leopard"—28-cm. (mounted on turntable on railway car, range 31 mi.); 20-cm. (used in Calais-to-Dover firing).

Field Guns: Light—7.5-cm. (standard at opening of war, replaced by same calibre of better range). Medium—10-cm. (standard for many years); 15-cm. (K-18) displaced the 10-cm.; 15-cm. (K-39) displaced the K-18. Heavy—15-cm. (became obsolete during World War II and relegated to coast defense); 17-cm. (highly mobile); 21-cm. (stolen from Czechoslovakia). Mountain—7.5-cm. (used first in Tunisian campaign).

Mortars: Light—5-cm. (compact and easily transportable); Spigot—20-cm. (used to destroy mine fields); Heavy—8-cm. (conventional design produced in 1934); 8-cm. (later type, shorter and lighter); 12-cm. (conventional type, modelled from Russian type); Smoke—two types, both 10-cm.

Anti-aircraft: 2-cm. (initial standard weapon); 3-cm. (improvement in vertical range); 4-cm. (Bofors—easily replaced barrel); 5-cm. (gas-operated automatic weapon); 12.8-cm. (with the 8.8-cm. constituted Germany's standard heavy anti-aircraft weapons).

Antitank: 3.7-cm. (early standard German weapon—discarded early in World War II); 5-cm. (introduced in 1941 during campaigns in Greece and Egypt); 4.7-cm. (stolen from Czechs, early discarded); 7.5-cm. (antitank and antipersonnel. This replaced an 1897 French model which Germans had mounted); 7.62-cm. (Russian piece modified by German); 8.8-cm. (3 in this group of heavies, the Pak 43, 43/1, and 43/2). Germans also used 3 tapered bore types—2.8/2.0-cm. (first used in Libya in 1941), 4.2/2.8-cm. (used in European theatre in 1942), and the later 7.5/5.5-cm. model.

Automatic Anti-aircraft and Antitank Guns: 2-cm. (Danish type popular in German navy); 2-cm. (38), usually mounted in fours.

Special Type Guns: 8.8-cm. (highly publicized in African campaigns; really an anti-aircraft weapon); 10.5-cm. (2 types, static and mobile; these were the German standard heavy anti-aircraft weapons).

Recoilless Gun: 7.5-cm. (airborne weapon, actually a short, rifled howitzer); 10.5-cm. (produced in 3 types, L.G. 40, 42 and 42/1).

Tanks: German tank markings were rather complicated. Allied troops recognized the types simply as Mark I, II, III, IV, V. Of the Krupp-manufactured Mark I, there were three types, one produced in 1934, another water-cooled type and a third fitted up as a commander's armoured office. Mark II—six models (A produced in 1937; B and C in 1938, weak frontal armour; D and E built in 1939 and later converted into flame-thrower tanks; F, built in 1941, corrected many of the faults of the earlier tanks). Mark III—14 models (A, B, C, D, E—armed with 3.7-cm. cannon and 2 light machine guns; F, G, H—first to replace 3.7-cm. with 5.0-cm. cannon; J, K—improved by thickening armour from 3.0 to 5.0-cm.; L, M, N, O—revamped to air-cooling system for desert work). Mark IV—10 types (A, B, C, D, E—standard medium tank weighing up to 24 tons; F-1, F-2, G, H, K—armour thickened and heavier gun calibres introduced). Mark V—3 produced in 1937. Latest World War II heavies, Mark VI, were the "Panther," hull and superstructure a single unit, submersible to a depth of 14 ft. 9 in.; the "Tiger," superstructure welded to hull—weight 63 tons. A later model weighed 75 tons. An improved Tiger tank chassis mounted a 38-cm. rocket projector. U.S. bazooka teams repeatedly knocked out German heavy tanks.

Antitank, Self-Propelled: Pak (+)—4.7-cm. antitank gun on Model B tank chassis; Pak 36—German modification of Russian weapon, mounted 7.62-cm. gun; Pak 39—Czech tank chassis, Model 38, with 7.5-cm. gun; Pak 40—produced in 1942 and used in Tunisia, mounted 7.5-cm. gun;

Pak 40/1—German 15-cm. heavy field howitzer mounted on French Lorraine tank chassis; Pak 40/3—7.5-cm. gun on Czech turretless tank chassis; Pak 42—heavy gun mounted on modified Mark IV tank chassis; Pak 43/1—first named "Hornet," later "Rhinoceros." First used in Spain in 1934 as semimobile anti-aircraft gun; improved for battle of France where it knocked out heavy French tanks. This was a very efficient 25-ton weapon. Pak 43/2—"Ferdinand," later known as "Elephant." An 80-ton assembly, the heaviest of German self-propelled antitank guns. Mounted 8.8-cm. gun on special chassis. First used against Russians in 1943; Pak 43/3—heavy gun mounted on standard "Panther" tank chassis. This weapon proved equally effective as an antitank or assault weapon.

Japanese Artillery Weapons—Howitzers: 70-mm.—made in 1932, rifled, single-shot infantry support weapon; 105-mm.—made in 1931, a lighter piece than the U.S. 105; Model 4, 150-mm.—horse-drawn model designed in 1915, superseded by Model 96 in 1936, but used all through World War II.

Field Guns: 37-mm.—developed in 1922, and later improved; still the Japanese used it through World War II; 37-mm. Model 94—developed in 1934 as close support weapon; 75-mm. Model 38 made in 1905—improved in 1930 (Model 90), and again in 1935, but all 3 models kept in service; 75-mm. Model 41—originally pack artillery, it became standard regimental gun; 75-mm. Model 90—developed secretly to be Japanese divisional field artillery weapon. Its distribution was begun in 1936; 105-mm. Model 92—in 1932 it superseded Model 14 of 1925. Designed for long-range fire; 75-mm. Model 49—a mountain gun, built in 1934.

Mortars: 50-mm. Model 98—designed in 1938 to fire stick bombs; 70-mm. Model 11—rifled tube, designed in 1922; 81-mm. Model 97—manufactured in 1937, similar to U.S. 81; 81-mm. Model 99—light, smooth-bore weapon firing particularly heavy shell; 90-mm. Model 94—developed in 1934 with recoil mechanism; 90-mm. Model 97—made in 1937, similar to U.S. Stokes; 320-mm. Spigot—fires 674-pound projectile, more than weight of entire mortar; 150-mm. Model 97—used primarily in fixed emplacements for island defense.

Anti-aircraft and Antitank: 13-mm. Model 93—copy of French Hotchkiss; 20-mm. rifle—developed in 1937 to be handled by two men; 20-mm. cannon, Model 98—could be fired either mounted on wheels or on outriggers; 25-mm. cannon—made for naval service; 75-mm. Model 88—designed in 1928, capable of quick emplacement.

Tanks: Light—Model 2592, built in 1932, used in China for reconnaissance tasks; Model 2593, built in 1933, converted to amphibious type; Model 2594, built in 1934 and used as a prime mover; Model 2595, built in 1935 and succeeded in 1937 by Model 2597 which eliminated many previous faults. Light tanks mounted 7.7-mm. machine guns. Medium—Model 2589-A, built in 1929 using World War I Whippets and Vickers as models; Model 2589-B, improvement on "A" type and provided better mounting for gun; Model 2594, modification of 2589 and used extensively in China; Model 2597, produced in 1937 it incorporated best features of light tanks; Model 2597 Special, improvement on preceding model. First used in 1942.

Small Arms.—These are weapons 0.60 inches or under in calibre, used primarily by infantry, carried and operated usually by one or two men. The term includes rifles, pistols, carbines, machine guns and submachine guns.

Semiautomatic Rifles.—Experiences of World War II defined four semiautomatic rifles for standard issue. They were (1) The U.S.M1 (Garand). By 1945 it was the stand-

ard U.S. rifle. The Springfield M1903A4 was also used for sniper work. The Garand was adopted in 1936. (2) The Johnson M1941, developed from 1936 to 1940 and adopted by the Netherlands. (3) The Gewehr 41, 41M, 41W, and 43. Germans began to adapt semiautomatic principles to the infantry rifle only in 1941, bringing out the first three Gewehr models here listed in that year. The 43 model, developed between 1942–45, represented the best produced in this class. (4) Simonov M1936, Russia's first semiautomatic shoulder rifle. Some of its features were copied by the Japanese in their Type 96 and 99 LMG. The Simonov was replaced in Russia by the Tokarev M1938 and M1940. The Italians in the Ethiopian campaigns and in the European theatre used a Czechoslovakian semiautomatic rifle. Of the above, the Garand and Johnson used .30-calibre ammunition, the Gewehr used 7.9-mm. cartridge and the Tokarev, 7.62-mm., the latter two both being smaller than the U.S. types.

Submachine Guns.—Known in Great Britain as machine carbines and in Germany as machine pistols, these were used extensively in World War II as close-range weapons, and were intended to give heavy fire support to advanced infantry units. U.S. models fired the .45-calibre Colt automatic pistol cartridge. European models, with the exception of Russia, used the 9-mm. Luger cartridge. Russia used a 7.63-mm. Mauser cartridge.

In the United States the familiar "tommy gun" led the series. The types were M1921A, the M1928 and the M1928A1. The British were furnished thousands of this latter model. The Thompson submachine gun M1 was a modification of the original model and was intended for U.S. issue. It was quickly followed during World War II by the M2 and M3.

Another important submachine gun was invented by Eugene Reising; three types of the H and R Reising submachine gun were brought out and manufactured for World War II—the M50, M55 and M60. The 55 was a paratrooper model. Three other types of submachine guns were manufactured in the United States and used in World War II—the Sedgley, the Smith and Wesson light rifle M1940, and the United Defense gun. The two latter types were furnished broadly to U.S. Allies. British types of this class of weapon were the Sten Mark I, II, III and V; the Lanchester MK I; the Austen Mark I and II; and the Owen Mark I and II. German types were: the Bergmann M1934; the machine pistol M18-1; the Steyr Solothurn SI-100; the Schmeisser MP38/40; and the Erma MP. Russian designs followed the German Bergmann pattern. They were known as M1934/1938, the M/1940 and the PP SH-41. The Italians employed two types, the Italian Beretta and the Beretta Moschetti.

Carbines.—The United States probably led the world in developing the carbine. Its tests in 1941 brought the M1, which was subsequently modified into types M1A1, the M1A5, the M1A4 and the M2, the latter adopted in 1944, and the finest weapon in its class. A model developed by Howard R. Clarke was under test in 1946 and was particularly notable for simple and compact design. Axis weapons in this class were the German types KAR44 and the Volksturm carbine M45, the latter developed in the final months of the war and little used.

Machine Guns.—In the United States most of the types used were designed by John M. Browning, who also designed most of the Colt automatic pistols. The heavy machine gun predominated in World War I; the light, in World War II. It went everywhere that troops went. Types

were: the Lewis M1915, adopted also by the British and exactly copied by the Japanese; the Browning M1918 (B.A.R.), used extensively by several nations in World War II. It was modified and widely used by the United States in World War II as Model B.A.R. M1918A2. Another model, not as widely used, was the Browning M1919A6. The Johnson M1941 was developed by experimentation into the M1944/1945 and furnished a much higher cyclic rate of fire than its predecessor. In Europe, the standard light machine guns for Great Britain in World War II were the Bren gun and the Czech ZB. Both of these were copied by the Japanese. The British also used a variation of the Bren, known as the Vickers-Berthier. The Germans entered World War II with the Dreyse-Solothurn MG34 as their light machine gun weapon. This was later improved and known as the MG42. The Germans also developed a very lightweight machine gun known as the Fallschirmjaeger Gewehr 42/44, designed for paratroopers' use. The best Japanese weapons in this class were the Type 96 and 99, which replaced the 1922 version of the Nambu, a Hotchkiss weapon. A late Russian light machine gun was the Dektyarov, whose initial faults were corrected after its performance in the Spanish Civil War had been observed.

Pistols.—Pistols had two uses, as a personal weapon and as a means of firing signal cartridges. For the latter purpose, the Allies rather generally used the Very pistol; the Germans used two Walther types, both 27-mm. calibre, one single and the other double-barrelled; the Japanese used a heavier, 35-mm. calibre weapon for this purpose. As a personal weapon, the U.S. Colt automatic .45-calibre was in a class by itself for accuracy and striking power. The Japanese used a Model 14, Nambu 8-mm. pistol, closely resembling the German Luger; they also had a "Baby Nambu" firing a 7-mm. calibre cartridge. An example of the latter type did not fall into Allied hands until the closing months of the war. The Germans, at the outset of World War II, used a Luger 9-mm. sometimes referred to as the "parabellum." The Walther pistol "P-38" superseded the Luger as their sidearm.

Ammunition.—Small Arms.—For military use, classes of small arms ammunition were rather limited. During World War II, the common ball type of ammunition was little used, its place being taken by armour-piercing (AP) types which could be used equally well against personnel and aircraft; API ammunition was fired to start conflagrations; API-T, in addition to setting fire to its target, left a tracer streak of fire and smoke. Tracer cartridges were also loaded singly as well as in combination. Calibres of these types

of ammunition were .30 for carbines, rifles and machine guns, .45 for pistols and submachine guns, .50 and .60 for machine guns used in aircraft or anti-aircraft.

Artillery Ammunition—Projectiles: The calibres of projectiles were, of course, determined by the bore of the weapon. Principal types of projectiles were recognized by shape, purpose and by filler employed. *High-explosive* artillery ammunition had usually one of two purposes, (1) to demolish matériel or (2) fragmentation, to kill personnel. *Chemical shell* might include solid, gaseous or liquid filling. The same types of filler were also found in bombs, grenades and rockets. Smoke-producing agents were also loaded into chemical shells. *Armour-piercing projectiles* had to be produced in accompanying ratio to the thickening of armour on tanks, aircraft and armoured vehicles. Most armour-piercing shells carried tracer inserts. High-explosive shells were of necessity fused, as opposed to armour-piercing. Even the smaller calibres, .20- and 40-mm., were made in both high-explosive and solid shot patterns. *Mortar projectiles* were lighter in construction than artillery projectiles. Principal types of mortar projectiles used were high-explosive, chemical, smoke and illuminating. By shapes there were two mortar shells—the "tear drop" used in 60-, 81-, 105-, and 155-mm. mortars; the "cylindrical" used only in the rifled 81-mm.

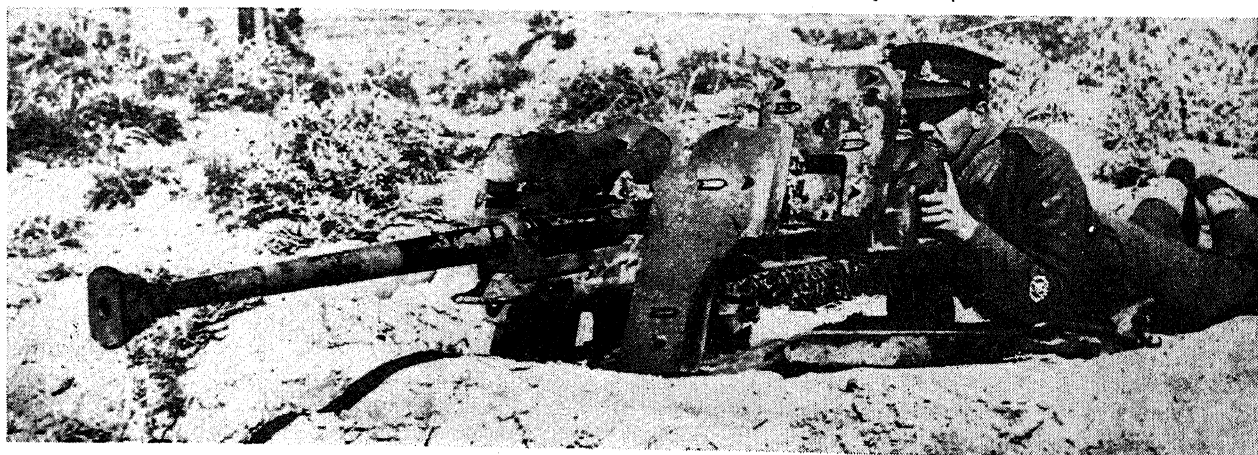
Illuminating shells served the purpose indicated by their name. Battlefields were lit brightly by burning magnesium flares floating from parachutes contained in illuminating shells which had been fired either to light an objective or convey a signal. Very pistol cartridges also discharged coloured light signals into the skies. Some shells were known as "propaganda projectiles" since their burst loosed countless printed leaflets to flood enemy terrain.

Grenades.—Hand, potato masher, rifle, incendiary were the chief types. The rifle grenade was used against tanks and armoured vehicles, and for incendiary, booby trap, demolition, smoke and signal purposes. The hand type depended on fragmentation for its value as an antipersonnel weapon.

Mines.—These included land mines, antitank (HE) mines, antipersonnel mines, beach mines, booby trap mines. A notable antipersonnel mine was the "Bouncing Betty," which first rose a few feet into the air and then scattered death-dealing shrapnel in a circle about it.

Miscellaneous Munitions Items.—It is only possible here to indicate briefly some of the many tools of war not previously mentioned.

The Guerlich, a highly efficient 1-in. German antitank gun, firing shells at the extremely high velocity of 4,750 ft. per second by compressing them in a tapered barrel. A British soldier is demonstrating this captured Guerlich



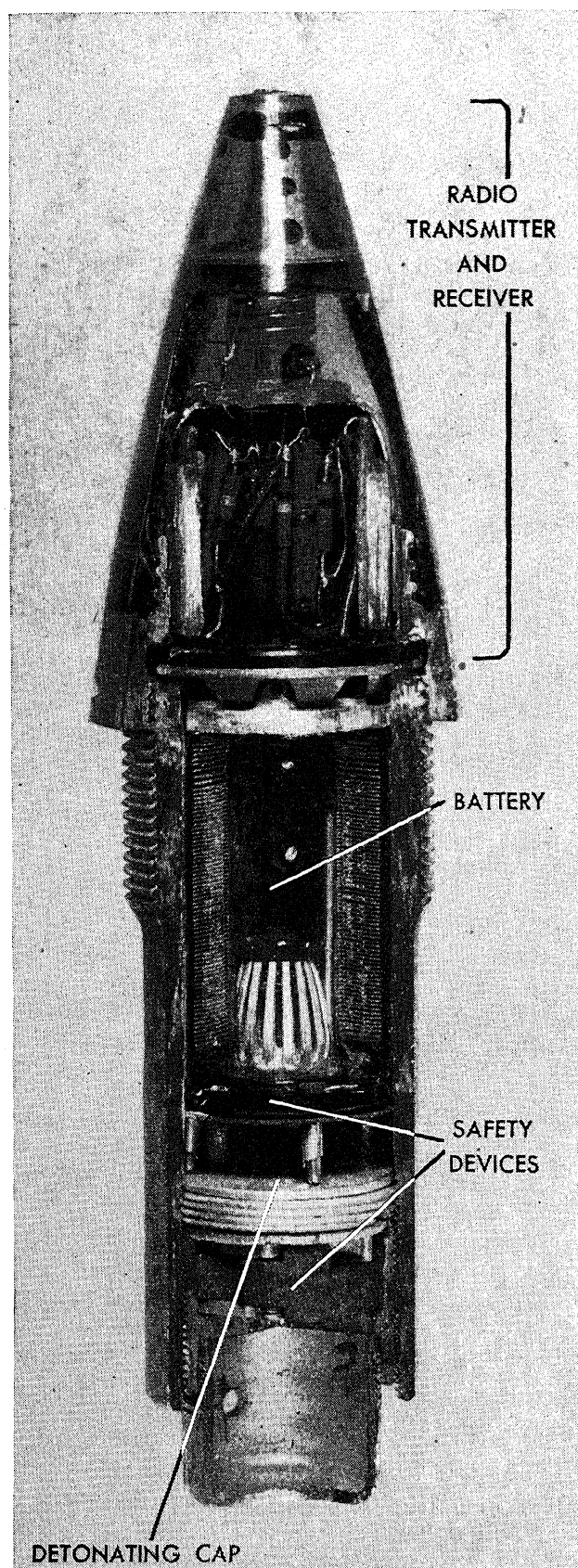
Bombs.—The two principal types were demolition and incendiary. A third type was the chemically-filled bomb. The demolition types varied from the 100-lb. size to the British "volcano," weighing 22,000 lb. The term "block-buster" as applied to these heavy bombs was truly descriptive. The incendiary bombs, dropped singly or in clusters, burned out populated areas all over Germany. Filled with chemicals which clung to whatever they set on fire, their efficiency record was written in the record of hundreds of German-populated areas scorched from the face of the earth. Their counterpart in land warfare was the flame thrower, whose searing jelly consumed everything it touched. The bomb was particularly an aeroplane weapon. However, the buzz bombs and robombs with which the Germans raked British cities were jet-propelled, and their flight was regulated by an automatic timing device which eventually tipped the robot into a 60° dive. In naval aviation the depth bomb released from a plane accounted for the destruction of many submarines. Single Napalm fire bombs could create destructive fires over 30,000 sq. ft. of territory. The U.S. navy had three efficient, modern types of bombs: the "Glomb," 4,000 lb., a pilotless glider; the "Gorgon," 1,000 lb. a jet-propelled missile carried by a bomber plane and guided to its target by radio, attaining a speed of 550 m.p.h.; the "Gargoyle," a 1,000 lb. jet-propelled bomb which traveled at 600 m.p.h. The U.S. army had the "Azon," a 1,000 lb. bomb having gyro and radio control for azimuth, and the "Razon," which could be controlled in range as well as in azimuth. (See also CHEMICAL WARFARE; INCENDIARY WARFARE; JET PROPULSION.)

The acme of bomb construction and performance was, of course, the atom bomb, which, by its destruction of Hiroshima and Nagasaki, definitely hastened the end of the war. Tests in the Bikini atoll during the summer of 1946 were expected to determine the future use of this weapon. (See also ATOMIC BOMB.)

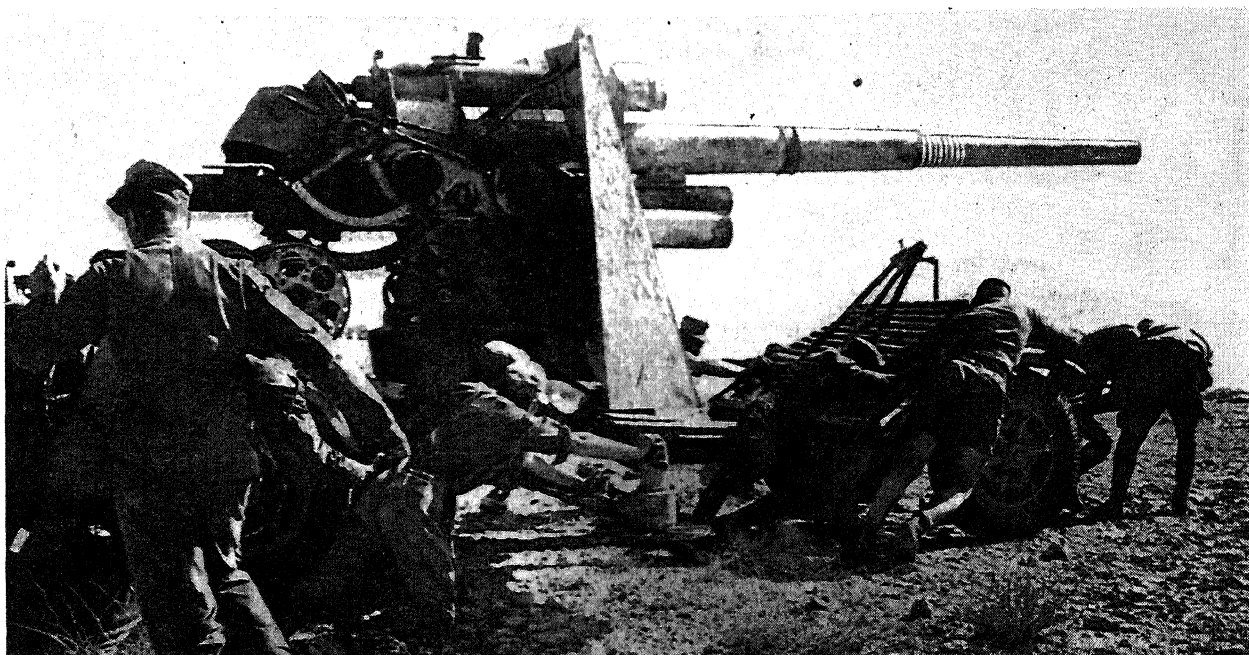
Rockets.—Originally pyrotechnic weapons for signalling, rockets underwent an evolution that finally saw the German V-2 rocket emerge as a powerful weapon of destruction. This was really a rocket bomb. Its warhead contained a ton of explosives and, shot from concrete ramps, reached a height of 20 mi. from the earth before it began to arc. At the zenith of the arc, the bomb was 55 mi. from the earth and was traveling at a speed of 5,000 ft. per second. Many of these bombs were recovered by U.S. forces, along with a few of the German V-3 type. Taken back to the United States, they were thoroughly tested. In July 1946 one V-2 bomb rose in Arizona to a peak height of 104 mi. before turning earthward.

The bazooka shell was a true rocket, and its tremendous striking power enabled an infantryman to stand alone to challenge, and often vanquish, a tank. (See also ROCKETS.)

Proximity Fuse.—Bombs and projectiles alike owed a major portion of their efficiency quotient to an invention which definitely hastened the end of the war—the proximity fuse. This consisted of a small, rugged radio transmitter and receiver, about the size of a man's fist. Placed in a bomb or projectile, it sent out high-frequency radio waves which caused detonation of an explosive charge when the waves bounced back from enemy aircraft, vehicles or the earth itself. To produce power for this minute radio there was perfected a generator, motivated by a small windmill propeller and recessed in the nose of the propeller. This windmill generator was no longer than a watch, but, at 100,000 r.p.m. supplied enough power to create continuous emanation of radio waves from the bomb or the pro-



Cross section of a radio proximity (VT) fuse developed in the U.S. and first revealed on Sept. 20, 1945. The fuse, containing a radio transmitter and receiver, was fitted into the nose of a projectile. When the projectile was fired, the transmitter sent out a continuous wave. As it moved within effective range of a target, part of the wave was reflected back to the receiver, and an electronic device exploded the missile



The German mobile 88-mm. gun, one of the most publicized guns of World War II, used with considerable effect against British tanks in the Libyan desert

jectile fitted with the proximity fuse. (See also RADAR.)

Explosives.—The following listing covers the principal explosives used during World War II: (1) lead azide, most sensitive of modern military explosives. It replaced mercury fulminate. (2) Petn (pentaerythrite tetranitrate). (3) T.N.T. (trinitrotoluene). (4) Tetryl, used in small-calibre projectiles. (5) Tetrytol, used in bombs, in chemical and smoke shells. (6) Cyclonite, used primarily with other explosives to form mixtures, principally the various RDX types. (7) RDX-A, cyclonite, T.N.T., and wax mixed; RDX-C, cyclonite plus plasticizer, a plastic explosive much used in bombs. (8) Amatol, in varying percentages, a mixture of T.N.T. and ammonium nitrate.

Munitions Auxiliaries.—This field is extremely broad. A few examples of World War II are given below:

Norden Bombsight.—One of the reasons for the superiority of U.S. aeroplane bombing.

Around-the-Corner Gun.—Claimed by the Germans as their innovation. A patent covering it was placed on file in the U.S. patent office, dated 1916.

Bangalore Torpedo.—Used to clear away barbed wire, to jam caterpillar tank treads, destroy railway tracks and as a component of booby traps.

Jeep.—An all-purpose motor vehicle.

Duck.—An amphibious $2\frac{1}{2}$ -ton truck.

Walkie-Talkie.—A radio set light enough to be carried anywhere. Operated as easily as a telephone handset. Followed by the Handie-Talkie.

Mats.—Steel; perfected to facilitate beach landings of heavy equipment.

Armour.—Body; developed to protect aviators from neck to hips.

Helmets.—New antiflak types developed.

(See also ATOMIC BOMB; AVIATION, MILITARY; BIOLOGICAL WARFARE; CHEMICAL WARFARE; INCENDIARY WARFARE; NAVIES OF THE WORLD; RADAR; STRATEGY OF WORLD WAR II; SUBMARINE WARFARE; TACTICS OF WORLD WAR II; WORLD WAR II.)

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Journal; *Command and General Staff Military Review*; *Deutsche Wehr*; *Militär-Wochenblatt*; *Krasnaya Zvezda*; Roger Marsh, *The Baby Nambu* (1946); W. H. B. Smith, *Walther Pistols* (1946); *The N.R.A. Book of Small Arms* (1946); *A Basic Manual of Military Small Arms* (rev. 1945); J. R. Newman, *The Tools of War* (1942). (R. S. T.)

Murphy, Frank

Murphy (1893–), U.S. jurist, was born April 13, 1893, at Harbor Beach, Mich. He received his B.A. and LL.B. degrees at the University of Michigan and continued graduate study at Lincoln's Inn, London, and at Trinity college in Dublin. He practised law in Detroit, Mich., from 1916 until the United States entered World War I, when he went to France as a first lieutenant and later as captain of infantry. After his discharge from the army of occupation in Germany in 1919, he returned to Detroit and was appointed chief assistant to the U.S. attorney for the eastern district of Michigan. From 1923 to 1930 he was judge of the recorder's (criminal) court in Detroit, and in 1930 he was elected mayor of the city. Re-elected in 1932, he resigned in May 1933 to accept appointment as governor general of the Philippines. Reputedly at the suggestion of President Roosevelt, he ran for governor of Michigan in 1936 and was elected. In 1938 he was defeated for reelection by Frank D. Fitzgerald. Roosevelt then named him U.S. attorney general on Jan. 2, 1939. One year later President Roosevelt named Murphy associate justice of the supreme court to succeed Pierce Butler (1866–1939). After a brief leave of absence from the court from June to Sept. 1942, when he served in the army as lieutenant colonel, he resumed his post on the court bench.

Murphy, Robert Daniel

Murphy (1894–), U.S. diplomat, was born Oct. 28, 1894, in Milwaukee, Wis. He entered the U.S. foreign service in 1917 as a clerk in the Berne legation, and held consular posts in Zurich, Munich and Seville until 1930, when he was transferred to the Paris embassy as consul and later as first secretary. After the collapse of French armies in June 1940, he followed the Pétain government to Vichy, becoming a counsellor in the U.S. embassy and chief U.S.

representative in French North Africa. Murphy was credited with having played an important role in preparing the groundwork for the U.S. invasion of French North Africa in Nov. 1942. For this work he was given the D.S.M. and was raised to the rank of minister. During the early part of 1943, he was the centre of a storm of criticism from the U.S. for his alleged co-operation with Vichy. When the advisory council to the Allied control commission for Italy was formed in Nov., Murphy was appointed as the U.S. member with the rank of personal ambassador. In Aug. 1944 he was made political adviser to Gen. Eisenhower, to help set up and operate the machinery for the Allied military government of the reich. During the occupation of Germany in 1945 and 1946, Murphy was again criticized in the U.S. and was charged with excessive leniency towards former nazis in the civil administration.

Murray, Philip

Murray (1886–), U.S. labour leader, was born in Blantyre, Scotland, on May 25, 1886, and emigrated to the United States in 1902. Naturalized in 1911, he became a member of the international board of the United Mine Workers of America the next year, and international vice-president in 1920. In 1935 he was named to the National Industrial Recovery board and to the advisory council of the National Recovery administration. The same year he helped lead the Committee for Industrial Organization out of the American Federation of Labor, and in 1936 he directed the steel workers' organizing committee of the C.I.O. Murray, the choice of John L. Lewis, succeeded the latter as C.I.O. president on Nov. 22, 1940, when Lewis fulfilled his pledge to resign if President Roosevelt were re-elected. But Murray did not share Lewis' bitter opposition to Roosevelt's foreign policy. A split developed in May 1942 when Lewis removed Murray as vice-president of the United Mine Workers. Murray, with the support of the C.I.O., fought back, and Lewis withdrew his union. In 1943, Murray urged a program including the no-strike pledge, more efficient use of manpower, reform of the War Labor board, a more progressive taxation policy and the stabilization of prices. When congress ignored these proposals and instead enacted the Smith-Connally anti-strike bill, the C.I.O. established a Political Action committee which supported President Roosevelt for re-election in 1944.

Immediately following the conclusion of World War II, the C.I.O., under Murray's guidance, launched its campaign for continued high wages, a broader social security program and an adequate full employment bill.

Museums of Art

See ART GALLERIES AND ART MUSEUMS.

Music

No previous decade in the history of music was more interesting from the standpoint of the interrelationship of art to the political and economic life of peoples than the ten years from 1937 to 1946. While one could very easily discuss this period from the standpoint of great creative figures—for this period produced great music—the discussion would miss the main point of the times. Almost no artist, of whatever nationality, of whatever disposition—conservative or radical—failed to feel the impact of great political and economic forces.

The 20th century had witnessed the struggle of composers against the Romantic-Germanic idea of the creative artist as "hero-philosopher" whose music had profound meaning, just as the early 19th century saw the struggle

against the Baroque-Italian conception of music as *bel canto*—the elegance and refinement of formalization. In rapid succession composers of the 20th century had experimented with impressionism, with primitivism, with abstractness of sound: Alexander Scriabin and Claude Debussy concerned themselves, in very different ways, with musical colour; Igor Stravinsky with primitive rhythm; Arnold Schoenberg with the abstract formulation of musical sound. These ideas of revolt against what seemed sentimental and confining in the aesthetics of the 19th century produced great music, but more often than not, music which had a very limited appeal to the lay audience. No experiment made during the first three decades of the 20th century had given the public the kind of serious music it demanded.

Actually, the cleavage between the tastes of the creative artist and the public had widened.

The aesthetic dilemma was felt in all western countries, and various solutions were suggested. The reactionary solution—to turn back to the Romantic-Germanic ideal with all its sentimentality and pompousness—was decreed, perhaps inevitably, by the Reich Music Chamber organized in Feb. 1936. By government propaganda, also, soviet Russia tried with considerable success to force the creative artist to abandon "petty bourgeois leftist tendencies" which made his art unintelligible to the masses of people. The blast of criticism during Feb. 1936 against Dmitri Shostakovich's opera *Lady Macbeth of Mtsensk* and his ballet *The Limpid Stream* indicated the Russian method of dealing with this aesthetic problem. While the government of the United States of America did not attempt to interfere with the composer's style, the people, by their indifference or their outspoken reaction to modern music, did. The composer in western society, even before the outbreak of World War II, was forced to consider more and more frequently the relation of his art to his audience. Possibly the central characteristic of art during the 20th century would be its social responsibility, as individualism was the "zeitgeist" of the 19th century and elegant formalism the inspiration of the 18th.

The economic depression of the '30s brought about in the United States the first great social experiment in the arts. The Federal Music Project of Work Projects Administration necessarily concerned itself with the tastes of the U.S. public. In 1936, 116,302 performances were given to an audience of 85,418,314 people. The Composer's Forum-Laboratory inaugurated in New York city in Oct. 1935 and extended during 1936 to several other cities of the country gave the U.S. composer a direct contact with the public. Composers were certainly not made by this experiment, but the style of their music was. With the liquidation of WPA in 1943 the process of governmental action had for the moment stopped in the United States, but many ideas derived from that experiment were carried over into private institutions and local communities. William Schuman, president of the Juilliard School of Music of New York city, indicated the extent to which new elements had moved into the control of old reactionary institutions. He wrote in the catalogue for the academic year 1946-47: "It is not enough that the musician be content with technical proficiency alone. He must be equipped to contribute, through his profession, to the development of music as a constructive force in contemporary life."

Whatever one might think of governmental control of the creative artist, there was no doubt that in the soviet union there had developed a vigorous school of composers.

While a few Russian composers already associated with western European culture, like Igor Stravinsky, had exiled themselves from the U.S.S.R., the larger group, including men like Reinhold Glière and Nikolai Miaskovsky, joined forces with the younger composers to develop a new soviet music. Serge Prokofieff returned to Russia, in fact, after a considerable period of exile. Shostakovich's fifth, sixth, seventh, eighth and ninth symphonies belong to the period. Prokofieff's *Fifth Symphony*, *Peter and the Wolf*, his beautiful *Seventh Piano Sonata*, not to mention his operatic works, belong also to this decade. Other names such as Aram Khatchaturian, Ivan Dzerzhinsky, Tokhan Khrennikov, Michael Gnessin and Dmitri Kabalevsky were coming more and more to be heard.

The actions of the Reich Music Chamber were much more oppressive to the creative artist. The "aryanization" of all music inevitably drove many of the finest German composers into exile, and with the German invasion of each new European country the group increased. Paul Hindemith and Schoenberg were the two greatest figures that left Germany. Richard Strauss remained the only great figure to espouse nazi aesthetics. The reactionary and nostalgic attempt to recapture the spirit of Richard Wagner stifled a living art. The most desperate attempts of the reich propaganda ministry to encourage works that possessed "creative and directive value for the future" could not make Werner Egk's *Die Zaubergeige*, produced in Berlin Feb. 15, 1936, or *Peer Gynt*, produced in Dec. 1939, into great music. There was some question, however, whether the nazi ideas about musical style sprang from the people. Certainly they did not spring from the people of occupied countries. Exhibitions of "decadent music," such as the reich Music Week festival at Duesseldorf May 22-29, 1938, were embarrassingly successful. These exhibitions, especially in Vienna, were closed when it became obvious that the recordings of such music were being listened to for enjoyment rather than criticism.

Perhaps no decade had seen so many musicians exiled from their native homes. Not only Jewish artists, but many other musicians who could not approve of the nazi persecutions, left Germany. Hindemith moved to Turkey and finally to the United States, where he became professor of composition at Yale university. The great musicologist, Dr. Alfred Einstein, moved first to Italy and finally accepted a chair at Smith college in Northampton, Massachusetts. Switzerland became the refuge for many. The number of exiled artists who migrated to the Americas was so great that it influenced profoundly the musical life and growth of the new world.

* * *

DURING THE DECADE it can be said that U.S. music came of age. At various times in the history of the United States there had been influxes of exiled European artists. The French Revolution bathed U.S. culture with French influences. The revolutions of 1848 staggered the slowly maturing U.S. music with Germanic influences. Each time these foreign influences had been painfully absorbed, leaving U.S. culture the richer. During the decade 1937-46, the effect of U.S. tastes upon the exiled European artist was almost as great as the reverse influence. The absorption of modern European ideas was, as a result, less upsetting to the U.S. musician. Indeed, the productivity of the U.S. composer during the ten years was enormous. The European composer greatly stimulated rather than depressed the musical life of the United States.

It was natural, perhaps, that the exiled composer should show the least interest in the social-aesthetic problem which dominated the times. Men like Hindemith, Schoenberg, Stravinsky, Béla Bartók and Darius Milhaud, all living in the United States, were mature artists whose aesthetic beliefs sprang from earlier decades of the century. Nevertheless, it would be misleading to suppose that these great men showed no sympathy to the problems of the time. Paul Hindemith's opera *Mathis der Maler*, based on the life of the great German painter who joined the futile revolt of the peasants against the ruling nobles, was produced in Zurich, Switzerland, in Nov. 1938. This opera, and especially the symphonic work derived from it, showed Hindemith in a new light. He spoke a persuasive emotional language understood by audiences. There was a new relationship between dissonance and consonance that became more and more apparent in his later style. Arnold Schoenberg's work showed less change. There were, however, such important scores as the *Fourth String Quartet* (Los Angeles, Jan. 9, 1937), a *Violin Concerto* (Philadelphia, Dec. 7, 1940) and, celebrating his 70th birthday in 1945, a *Piano Concerto* and *Ode to Napoleon*. Stravinsky had always been a figure of great stylistic changes. His *Duo for Violin and Piano* showed an unexpected lyricism. His other work produced during the decade included: a *Symphony in C* (1941), *Dances Concertantes* (1943), and *Sonata for Two Pianos* (1946). The mysticism of Béla Bartók's last works (he died Sept. 29, 1945, in New York city) made this composer a little less severe to audiences. Even "twelve-tone" music was given emotional meaning in the *Violin Concerto* of Alban Berg, performed in Barcelona, Spain, in 1936, performed and recorded in the United States during the years that followed. This composer died in Vienna in 1937. His opera *Lulu* was performed posthumously in Zurich, Switzerland, June 2, 1937.

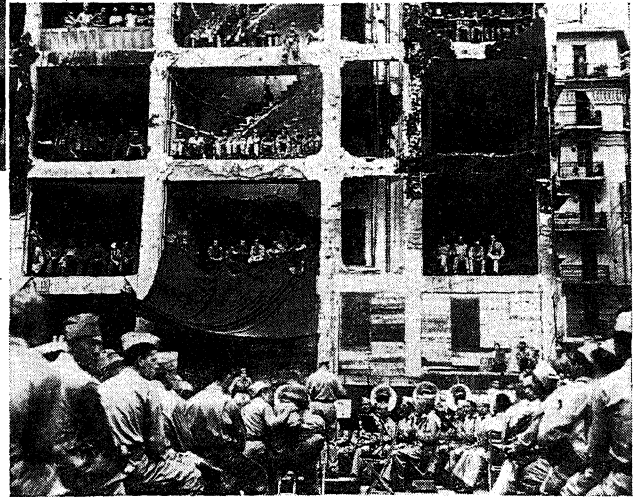
In spite of (or, perhaps, because of) the important production of European composers living in the United States, the native U.S. composer flourished; indeed, he flourished to such an extent that no brief account of the period could do justice to what was in fact a renaissance of music in the United States. Figures whose names were known during the '20s, such as Aaron Copland, Roger Sessions, Roy Harris, Howard Hanson, to mention only a few, all produced their most important works between 1937 and 1946. Aaron Copland's works for ballet and cinema brought him special attention. Roger Sessions' *String Quartet* (1937) showed again this composer's musical integrity. Roy Harris' *Third Symphony* (1939)—one of four written during these years—had a popular appeal. Howard Hanson's *Third Symphony* (1946) again showed this composer's mastery of the orchestra. There were also young figures who became known during the decade: Walter Piston, William Schuman, Samuel Barber, David Diamond, Nicolai Berezowsky, Lukas Foss and the young composer-conductor, Leonard Bernstein, and many others of almost equal importance. Nor could one justly ignore the production of older men like Frederick Jacobi, Louis Gruenberg, John Alden Carpenter and E. D. Hill—to name only a few who continued to give breadth to the fine diversity of U.S. musical culture.

The need for a greater rapport between composer and public was strongly felt in the United States. Composers began to realize how persuasively the U.S. people throughout their history had demanded the social integration of art. *Les belles arts* had no place in pioneer society. Americans, for better or worse, had refused to support a sophisticated art. Music had flourished when it associated itself with the process of living—with religion, social conflicts, political and economic events, play, the theatre, etc. The



Left: Red army musicians entertaining the ship's company aboard a British cruiser which put into a soviet port after escorting a supply convoy along the Arctic route in 1944

Below: Orchestra pit at a theatre in Naples, Italy, during a performance of *La Bohème* by noted singers of the Scala and San Carlo companies in Nov. 1943, staged through the co-operation of a U.S.A.A.F. unit



Above: "Box seats" were provided more numerous than usual by the exposed framework of a gutted building in Algiers, French North Africa, at an open-air band concert given for U.S. troops in 1943



Above: Drum section of a military band formed by Women's Auxiliary Air Forces at an R.A.F. station, rehearsing in England during 1942

Below: Outdoor concert at the Grant park band shell on the shore of Lake Michigan in Chicago, Ill., during the summer of 1946



serious composer in his effort to ally himself with the deep currents of U.S. thought often tapped the abundant folk music. Few U.S. composers totally ignored this source of inspiration. (See *FOLKLORE, AMERICAN*.) Others felt that contact with the radio or the cinema or the theatre offered a more direct composer-audience relation.

There were few composers like Roger Sessions who held aloof completely from the popular elements of art in their country.

* * *

THE MOST sensational work of the decade was Shostakovich's *Seventh Symphony*, written while the composer was serving as a fire fighter in beleaguered Leningrad. This work, begun in July 1941, was finished in Kuibyshev the following Dec. 27. It was first performed in Moscow March 1, 1942, in London June 29, and in the United States July 19. Its 73 minutes of music was given over to graphic description of war, to which the Allied nations spontaneously responded.

Prokofieff then began work on an opera based on Leo Tolstoy's *War and Peace*.

U.S. composers too were responding to patriotic demands. Aaron Copland produced his *Lincoln Portrait* in 1943, Earl Robinson turned out a series of patriotic radio works, demanding that "songs can be bullets." Randall Thompson set the writings of Thomas Jefferson to music. Samuel Barber wrote a symphony dedicated to and inspired by the air force. William Schuman wrote *A Free Song* to Walt Whitman texts and *Prayer—1943*. William Grant Still wrote *In Memoriam: The Colored Soldiers Who Died for Democracy*. Ross Lee Finney composed *Symphony Communiqué* and *Pole Star for This Year*, setting to music words by Archibald MacLeish. Roy Harris in the dedication of his *Fifth Symphony* explained his intention "to express qualities of our people . . . heroic strength, determination, will to struggle, faith in our destiny." The vitality of young composers was shown by the works they turned out while members of the armed services. Marc Blitzstein, Hugo Weisgall, John Ward, John Verral, Edward Cone and John Lessard composed symphonic works while overseas.

These works, expressing the foment of the times, might not be as important as others composed at greater leisure, but they reflected the concern of composers to find a closer relation between art and life.

The spirit of the time was also reflected by the Committee on Cultural Relations with Latin America. In 1937 this committee awarded a prize to Jacobo Ficher of Buenos Aires, Argentina, for his *Septima*. A festival of chamber music, sponsored by the Elizabeth Sprague Coolidge foundation was held in Mexico City. Roger Sessions' *String Quartet* was given its first performance on this occasion. The year 1940 saw the greatest inter-American activity. Arturo Toscanini gave 16 concerts with the NBC Symphony orchestra in Brazil, Uruguay and Argentina. Leopold Stokowski toured the same South American countries with an All-American Youth orchestra sponsored by the National Youth administration. At the same time prominent South American composers and performers visited the United States.

Music festivals were considerably affected by the restrictions on travel and communications during the war years. The International Society of Contemporary Music met in Paris in 1937 in conjunction with the Paris exposition, which sponsored many musical events, particularly



Ignace Paderewski playing at Chicago during his farewell concert tour in 1939

the German festival conducted by Wilhelm Furtwaengler and Clemens Krauss. In 1938 the I.S.C.M. met in London; in 1939 in Lucerne, Switzerland; and in 1940 in Warsaw. With the outbreak of war in Europe these festivals were moved to the United States, with a meeting in New York city in 1941 and one in Berkeley, Calif., in 1942. In 1943, however, the plans for a festival in Los Angeles, Calif., were abandoned because of transportation restrictions. The Salzburg and Bayreuth festivals changed from international occasions during the '30s to local German events sponsored by the "Strength Through Joy" organization for the soldiers and factory workers of the reich. The May festival continued in Florence, Italy, throughout most of the war. Two new operas by Francesco Malipiero were presented in Italy during the decade: *Antonio e Cleopatra* (May 4, 1939, in Florence), and *Ecuba* (Jan. 13, 1941, in Rome). Other Italian operas first performed were Ottorino Respighi's *Lucrezia* (Feb. 24, 1937, in Milan), Alfredo Casella's *Il Deserto Tentato* (1937, Florence), Vito Frazzi's *Il Re Lear* (1939, Florence), and Luigi Dallapiccola's *Vol de Nuit* (1940, Florence). While the Covent Garden opera season was interrupted in London during the war, Sadler's Wells productions continued throughout.

In the United States the Berkshire festival, after several brilliant seasons, was cancelled in 1943 and not resumed until 1946.

Music contributed to war-tormented populations of Europe one of the most welcomed releases. In France and the Low Countries any concert which was free from the taint of German propaganda control could be sure of a sold-out house. In small towns in England people crowded to hear chamber music. Small musical groups in Vienna expressed their protest by performing *Entartete Kunst*. Even the Vienna opera performed Rudolph Wagner-Regeny's *Johanna Balk*, causing a political-cultural scandal. Josef Goebbels personally issued a ban on performances of this work and tightened the Nazi grip on musical affairs in Vienna. Young composers and performers in Brussels, Belgium, joined to give emphasis to their national music and succeeded by various devices in continuing throughout the war their protest of German cultural domination.

After the end of the war in 1945 there was a great revival of music in Europe. In spite of the cold, concert halls and theatres were crowded. New figures arose whose work belonged to the future, and exiled composers returned to their homeland. In France the resistance composer Olivier Messiaen and his group of pupils at the National conservatory attracted interest. In England a new opera, *Peter Grimes*, placed Benjamin Britten at the head of English music. Bohuslav Martinů, after five years in the United States, returned to Prague to head the State conservatory, as Anton Dvořák did 50 years ago. Toscanini returned to conduct the La Scala productions in Milan, Italy.

(R. L. Fy.)

Popular Music.—During the ten eventful years from 1937 to 1946 popular music reflected much of the spirit of the time. There were spectacular surprises, incredible banalities and worthy achievements, with an occasional bit of successful nonsense and an adequate adherence to the accepted traditions of a generally conservative business. There was even a private war, between radio and the American Society of Composers, Authors and Publishers (A.S.C.A.P.), during which the public, as usual, was the chief sufferer.

In the hands of a few men, such as Jerome Kern, Richard Rodgers, Cole Porter, Irving Berlin and Sigmund Romberg, popular music actually established itself as a significant art form, with further co-operation from such serious musicians as Vernon Duke (Vladimir Dukelsky), Morton Gould, Leonard Bernstein, Kurt Weill and Robert Russell Bennett. The arrangers of popular tunes often proved more important than the composers themselves, and in many cases these anonymous individuals were clearly the better musicians. The value of words was also emphasized by the work of outstanding lyricists like Oscar Hammerstein II, Johnny Mercer and Ira Gershwin.

Radio's "Hit Parade" and the columns of *Variety*, could be accepted as fairly accurate indices to popular taste in music, and this brief summary of ten years of tunefulness is chiefly indebted to those two sources of information, supplemented by some personal observation and a modicum of professional advice and opinion.

The year 1937 was not distinguished in the field of popular music. There were a few good tunes, with a commendable tendency to revive authentic U.S. folk music, but nothing either commercially sensational or aesthetically admirable. The two biggest sellers of Tin Pan Alley were an arrangement of the bugle pattern called "When My Dreamboat Comes Home" and Billy Hill's "Chapel in the Moonlight," rhythmically indebted to Franz Lehar's "My Little Nest of Heavenly Blue."

The novelty song of the year was "The Merry-Go-Round Broke Down," with obvious opportunities for imitative

realism. The only "production number" to finish among the first 15 was "Little Old Lady," by Hoagy Carmichael and Stanley Adams, which appeared in the musical comedy *At Home Abroad*. The screen popularized three songs, "September in the Rain," "Moonlight and Shadows" and "That Old Feeling," besides awarding an "Oscar" to "Sweet Leilani," which its composer, Harry Owens, had been promoting successfully in Hawaii for at least two years. Of the remaining best sellers of 1937 even the titles soon were hard to remember. The list included "Boo Hoo," "It Looks Like Rain," "Sailboat in the Moonlight," "So Rare," "Harbor Lights" (an English song), "My Cabin of Dreams," "You Can't Stop Me from Dreaming" and "Once in a While." Rudy Vallee's persistence finally brought success to "Vieni, Vieni," adapted from an Italian folk song, with echoes of Giuseppe Verdi's "La Donna e Mobile," while "Serenade in the Night" also profited by an Italian background.

Dances like the "Big Apple" reflected the growing interest in folk materials, and the actual steps drew more and more away from the conventional ballroom technique. Just before the end of the year, a record by the Andrews sisters brought sudden popularity to the Jewish "Bei mir bist du Schoen," which its composer, Sholom Secunda, reputedly sold outright for \$15.

The radio columnist, Nick Kenny, had a hand in two of the big hits of 1938, with his "Gold Mine in the Sky" outselling all other sheet music of the year. This deliberately "corny" song, based on Stephen Foster, was curiously ignored by the "Hit Parade." Later the Kenny brothers hit the bull's-eye of sales once more with their "Cathedral in the Pines," also less prominent in radio than on the dealers' counters.

The two best songs of the year were probably "Love Walked In," by George Gershwin, posthumously published and promoted, and "Thanks for the Memory," whose composer, Ralph Rainger, was marked for untimely death, in a plane accident. Larry Clinton made a popular song out of Claude Debussy's "Reverie," by simply prefacing the word "My" and spelling it "Revery," thereby setting the stage for a long series of adaptations from the classics. The school of nonsense was represented in 1938 by Maria Grever's "Ti Pi Tin" (whose tune was unashamedly borrowed from the Spanish music of Edouard Lalo and Emmanuel Chabrier) and a swing arrangement of the old nursery rhyme, "A Tisket, a Tasket," for whose success the singer, Ella Fitzgerald, was largely responsible. There were also such inanities as the "Dipsy Doodle" and "Flat-Foot Floogey with the Floy Floy," whose cryptic syllabification obviously appealed to a large public.

The chief revival of the year was Irving Berlin's "Alexander's Ragtime Band," which came back forcibly through the motion picture of the same name. There was a strong reminder of Gershwin's "Tell Me More" in Burton Lane's "Says My Heart," although the parallel actually lay in the scale itself. Other hits were "Music, Maestro, Please," a midsummer sensation, and the Burke-Monaco "I've Got a Pocketful of Dreams."

Larry Clinton's demonstration of the permanent appeal in melodious classics carried on into 1939, with "My Revery" followed by "Our Love," whose tune came right out of Tchaikovsky's *Romeo and Juliet* overture. André Kostelanetz forgot his indignation long enough to turn the same Russian composer's *Fifth Symphony* (the slow theme) into "Moon Love." There was an echo of Maurice Ravel's "Pavane for a Dead Infanta" in "The

Lamp is Low," for which Bert Shefter was the entrepreneur, and Raymond Scott gave new popularity to Mozart's *Piano Sonata in C* by simply calling it "In an Eighteenth Century Drawing Room" and playing it as a fox trot.

The most popular song of 1939 was unquestionably "Beer Barrel Polka," based upon a Czech song and destined to become the outstanding hit of World War II. It was the first song in some time to pass the 500,000 mark in sales of sheet music. Second place in the "Hit Parade" was won by a nostalgic ditty called "South of the Border," which profited by some fairly obvious parodies. In third place was the far more individual "Deep Purple," originally an instrumental piece by Peter de Rose, to which an effective text was added by Mitchell Parish.

Abe Olman's "Oh, Johnny," which had been a sensation in 1917, began a new life through the ministrations of Bonnie Baker and Tommy Tucker, proving the timelessness of its basic argument. The nonsense song of 1939 was "Three Little Fishes," reverting to the baby talk brand of humour, with "Little Sir Echo" further exploiting the normal enthusiasm for extreme youth. Other hits of the year included "Umbrella Man," "Deep in a Dream," "Penny Serenade," "Wishing," "Sunrise Serenade," "Over the Rainbow," "Man with the Mandolin," "Scatterbrain," "Blue Orchids," "My Prayer," "And the Angels Sing," "Jeepers Creepers," "Stairway to the Stars" and "Rancho Grande."

The Berlin songs from *Snow White* maintained the popularity they had won in the preceding year.

In 1940, radio and A.S.C.A.P. finally reached a parting of the ways. The National Association of Broadcasters refused to discuss what they considered extortionate demands by A.S.C.A.P. and instituted a boycott which went into effect by the end of the year, with disastrous results for all concerned. Radio set up its own publishing company, Broadcast Music, Inc. (generally known as B.M.I.), and A.S.C.A.P. found out that the public would listen to unlimited arrangements of "Jeanie with the Light Brown Hair" and other noncopyrighted melodies, and that band leaders and soloists were content with whatever material the commercial powers would permit them to use.

Naturally the year produced little of novelty or importance in popular music. B.M.I. failed to land a single song among the first 15 hits, although its publications received considerable attention from the broadcasting programs, notably "Practice Makes Perfect," a pleasant little song by Ernest Gold, formerly employed by the Songmart (a clearinghouse for amateurs) and later a successful composer for the films in Hollywood.

Such songs as "South of the Border," "Oh Johnny" and "Scatterbrain" carried on from the previous year and actually remained at the top of the list so far as sheet music and record sales were concerned. Victor Herbert's old instrumental number, "Indian Summer," was given a set of words, to finish high up among the best sellers. Newcomers in the "Hit Parade" were "Careless," "In an Old Dutch Garden," the "Woodpecker Song," "Playmates," "Make Believe Island," "I'll Never Smile Again" (supposedly inspired by the death of its composer's husband), "Blueberry Hill," "Ferryboat Serenade" and "Only Forever." Walt Disney's *Pinocchio* contributed the popular "When You Wish Upon a Star" and Irving Berlin's "God Bless America" (dating back to 1917) became the people's choice for a national anthem, with all the composer's royalties going to the Boy and Girl Scouts.

An individual surprise turned up late in the year, when

Jerome Kern set an unpretentious melody to Oscar Hammerstein's verses, "The Last Time I Saw Paris," winning a real success in spite of all handicaps. Musical comedy had a good year, being independent of radio, with Cole Porter expressing himself in *Panama Hattie*, Rodgers and Hart in the highly original *Pal Joey*, Berlin in *Louisiana Purchase* and Vernon Duke in *Cabin in the Sky*.

Meanwhile, before the end of 1940 the department of justice had taken a hand in the war between radio and A.S.C.A.P., but before anything practical could be accomplished, popular music experienced perhaps the most dismal year of its entire history. The boycott against A.S.C.A.P. went into effect on the first day of 1941, although its threat had already acted as a serious handicap to the publication and exploitation of copyrighted songs.

According to sales of sheet music, the song of the year was "Intermezzo," revived from a motion picture of the same name, in which it had originally made little impression. Its chief melodic strain came out of Wagner's *Tristan und Isolde*, and its commercial success could be attributed mainly to the lack of competition. Its closest rival was the fox trot version of Tchaikovsky's *Piano Concerto* known as "Tonight We Love." (The same melody appeared in 15 other jazz arrangements, from "Concerto for Two" to "Boogie de Concerto.") The Russian romanticist also appeared among the "first fifteen" in the adaptation of his "Melody" to "The Things I Love."

B.M.I. successfully revived "Amapola" from its stronghold of the E.B. Marks catalogue and also imported the South American "Frenesi." Legitimate nonsense found refuge in the "Hutsut Song" (supposedly based on Scandinavian folk music) and a southern politician rode into office on his own hillbilly imitation, "You Are My Sunshine."

Meredith Willson, known as a serious conductor and symphonist, made a hit with his charming "You and I," and the closing days of the year saw the rise of a timely ballad, "The White Cliffs of Dover." The rest of the machine-made output included "Daddy, Do You Care?" "I Don't Want to Set the World on Fire," "I Hear a Rhapsody," "Maria Elena," "My Sister and I" and the "Shepherd's Serenade."

None of the war songs of 1941 competed seriously with Berlin's "God Bless America." In fact, World War II produced nothing to compare even distantly with U.S. patriotic music of the past. The field of musical comedy was enriched by Cole Porter's *Let's Face It* and that genial product of the pens of Ira Gershwin and Kurt Weill, *Lady in the Dark*, assisted by the performances of Gertrude Lawrence and Danny Kaye.

Irving Berlin was definitely the hero of 1942, which also saw peace forced upon the warring powers of radio and A.S.C.A.P. by the stern intervention of the U.S. government. Berlin's "White Christmas" prophesied a return to the good old days by selling more than 1,000,000 copies, aided by the astute business management of Saul Bornstein, who also had much to do with the success of "God Bless America." The veteran songwriter-publisher had to his credit one of the greatest stage successes of the year, *This is the Army*, which eventually played overseas as well as all over the U.S., and one of the outstanding motion pictures, *Holiday Inn*, with Bing Crosby and Fred Astaire interpreting some more Berlin hits. "Be Careful, It's My Heart" and "I Left My Heart at the Stage Door Canteen" joined the select circle of the "Hit Parade," to round out an impressive year for their composer.

"The White Cliffs of Dover" maintained its popularity and finished the year in second place, within hailing dis-

tance of "White Christmas." Third place went to a rather short-lived war song, "Praise the Lord and Pass the Ammunition," with a tune that suggested "The Old Gray Mare," followed by an obscure piece of hillbilly music, "There's a Star Spangled Banner Waving Somewhere."

Following the trend of "The White Cliffs of Dover," but musically derived from Beethoven's familiar "Minuet in G" was "When the Lights Go On Again," and there was a war flavour also in "Johnny Doughboy Found a Rose in Ireland" and "He Wears a Pair of Silver Wings." Far more popular with the men in uniform was "Don't Sit under the Apple Tree" ("With Anyone Else But Me"), whose tune merely jazzed up the ancient "Long, Long Ago."

Novelty was provided by a jingle of jitterbug jargon called, "Mister Five by Five" (referring to a square-shaped bandman), "Jersey Bounce" and the hand clapping sound effects of "Deep in the Heart of Texas." What was originally intended as a caricature of cowboy songs, "Jingle Jangle," developed into an honest hit, much to the surprise of its creators, while Johnny Mercer succeeded in catching some of the spirit of traditional folk music in his words for "Blues in the Night."

The leading waltz song of 1942 was "Rose O'Day," with echoes of the "far away" of "Round her Neck She Wears a Yellow Ribbon" and the eternal appeal of a fast patter of nonsense syllables. "Somebody Else is Taking my Place" borrowed its melody from Harry von Tilzer's "Please Go 'Way and Let Me Sleep," with no apparent objections from the original composer. Worth mentioning also are "Skylark," "One Dozen Roses" (melodically similar to "The Old Time Religion"), "Sleepy Lagoon" (most-played song on the "Hit Parade"), "My Devotion," Jerome Kern's "Dearly Beloved" and a vocal version of the instrumental "Manhattan Serenade."

The musical war of 1943 was between James Caesar Petrillo and the recording companies. Petrillo forbade his men to make records of any kind until a substantial new tax had been paid by the manufacturers. For a time the record business was practically at a standstill, with a shortage of materials as an added handicap. The new singing star, Frank Sinatra, managed to make a few recordings with choral accompaniment (the musicians' union recognizes only instrumentalists) and the disk manufacturers dug into their backlogs of old "masters," bringing out some music that might otherwise never have reached a phonograph.

Decca finally capitulated, thus getting the jump on its competitors, although at considerable cost.

Richard Rodgers and Oscar Hammerstein II struck a new note and definitely raised the level of popular music in 1943 by writing *Oklahoma!*, the first of a series of creations and productions which set a standard. They brought a sudden dignity and prestige to a business that sadly needed it.

The best song of the year was unquestionably the Rodgers-Hammerstein "People Will Say We're in Love," but *Oklahoma!* contained several other hits, notably the earthy waltz song, "Oh, What a Beautiful Morning!" Hammerstein scored independently with his *Carmen Jones*, a modernization of Georges Bizet's opera, played by an all-Negro cast and produced by that one-time song writer ("Barney Google," etc.), Billy Rose. The death of Lorenz Hart forced Rodgers to find a new collaborator, and it quickly became evident that Hammerstein was the ideal replacement. Their partnership as both writers and producers made a continuous record of phenomenal success.

Of the general run of popular songs in 1943 some of the most successful were well-judged revivals, like "For Me and My Gal" (greatly helped by Judy Garland's screen interpretation) and "Put Your Arms around Me, Honey." The surprise (and perhaps the biggest seller) of the year was the 25-year-old "Paper Doll," which E. B. Marks turned into a spectacular hit long after its apparent death and the actual murder of its composer, Johnny Black. Herman Hupfeld's "As Time Goes By" won a new life through its inclusion in the film, *Casablanca*, where it was sung by Dooley Wilson in association with Ingrid Bergman and Humphrey Bogart.

Frank Sinatra, voted the most popular singer of the year, did much for such sentimental ditties as "All or Nothing at All" and "Sunday, Monday or Always," while the rather absurd, "Don't Get Around Much Any More" eventually profited by the sidesplitting burlesque of Jimmy Savo.

"Pistol Packin' Mama" was the novelty song hit of 1943, with a pseudo-folksy quality, plus hillbilly monotony, to point up its deliberate paradoxes. But a possible best seller of sheet music and records was again "There's a Star Spangled Banner Waving Somewhere," right out of the authentic factory of Bob Miller. Champion of the "Hit Parade" of radio was the motion picture song, "You'll Never Know," which appeared 24 times, 9 times at the top. Other numbers prominent in this popularity poll were Walt Disney's good-neighbour ditty, "Brazil," the air-minded "Comin' in on a Wing and a Prayer" (with a tune suspiciously similar to that of "Jingle Jangle"), "It Can't Be Wrong," "There Are Such Things" and "Taking a Chance on Love," featured in both the film and stage play, *Cabin in the Sky*.

Cole Porter scored again with "You'd Be So Nice to Come Home To," acknowledging some melodic indebtedness to Pablo Sarasate's "Gypsy Airs" and perhaps the traditional "Hoochie Coochie." Berlin's "White Christmas" kept right on selling, with a natural peak during the holiday season. Considerable success was won also by such songs as "Moonlight Becomes You," "That Old Black Magic," "I Had the Craziest Dream" (musically indebted to "Frankie and Johnny"), "I've Heard that Song Before," "Let's Get Lost," "In the Blue of the Evening" and "They're Either Too Young or Too Old," surprisingly sung by Bette Davis in a film produced by its composer, Arthur Schwartz.

Popular music had a good year in 1944, aided by the capitulation of the two biggest recording companies, RCA-Victor and Columbia, to the demands of Petrillo. Not only did the sale of records increase noticeably, but the efforts of Tin Pan Alley met with more consistent success than usual. There was still a dearth of good war songs, and the indications were that the public had permanently turned thumbs down on such material. But there was no lack of successful ballads, novelties and revivals.

The leading hit of the year was probably "I'll Be Seeing You," introduced by Hildegard and heavily favoured by Sinatra. The latter also did much for the sentimental "Good-night, Wherever You Are" and the clearly derivative "I'll Get By," combining the best features of Anton Dvořák's "Humoresque" and the folk song, "Estrellita."

Irving Berlin enjoyed a revival of his "Always," added to the continuing success of "White Christmas," and even the vapid "Paper Doll" managed to stay near the top of the "Hit Parade" far beyond the expectations of its publishers. Other old-timers to appeal to modern ears were "It Had to

be You" and "Together," the latter featured in the film, *Since You Went Away*.

"Dance with a Dolly" frankly exploited the gay tune and some of the words immortalized by a minstrel song of 1848, "Buffalo Gals" (originally "Lubly Fan," written by Cool White). The Latin-American "Besame Mucho" borrowed its leading phrase from the "Goyescas" of Enrique Granados, while "It's Love, Love, Love" came straight from the Calypso music of Trinidad, with a close relationship to "The Duke and Duchess of Kent." "My Heart Tells Me" belonged to the same melodic school as "Goodnight, Sweetheart," with Franz Schubert and Franz Liszt as possible ancestors, and the lively "San Fernando Valley" could hardly escape comparison with "Sweet and Hot" ("I Gotta Have Music") sung years before by the temperamental Lyda Roberti.

There was novelty and a real laugh in the nonsensical "Mairzy Doats," purporting to be a child's pronunciation of "Mares eat oats," and this bit of gibberish upheld a tradition that went all the way back to the Elizabethan madrigals, when a "Hey nonny no" had not yet added a "hotcha-cha." Novelty and humour raised their pretty heads also in "Milkman, Keep Those Bottles Quiet" (raucously delivered by Nancy Walker) and "Is You Is or Is You Ain't My Baby?"

A quieter spirit pervaded the charming lullaby, "Shoo, Shoo, Baby," whose best interpreter was the beautiful Lena Horne.

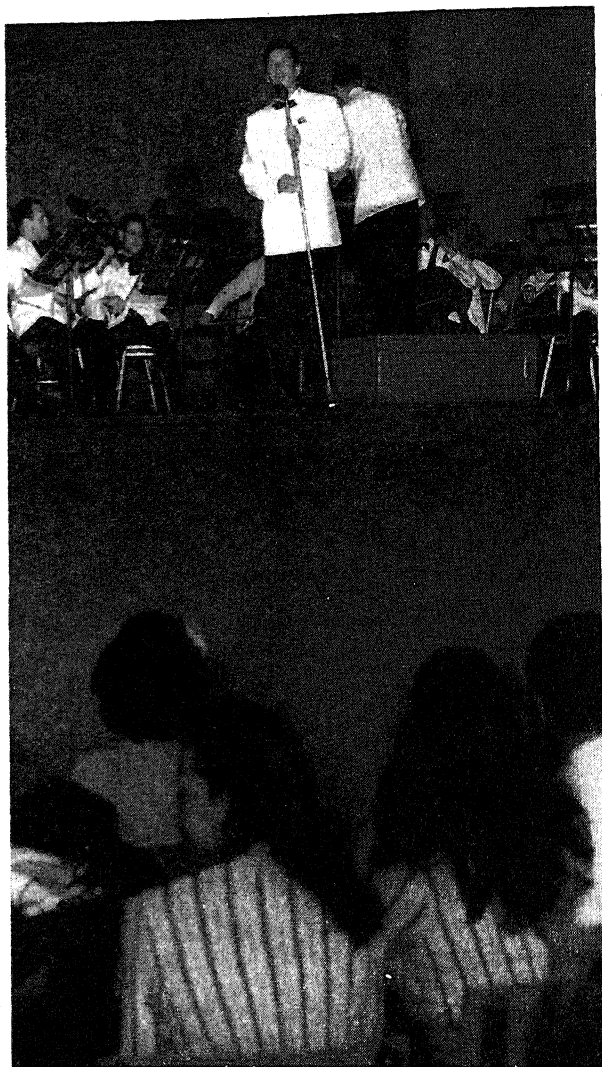
It may be doubted whether 1944 produced a better popular song than "Swinging on a Star," happily blessed by the voice of Bing Crosby in the immensely successful motion picture, *Going My Way*. Its nearest rival was probably Jerome Kern's, "Long Ago and Far Away," with a typical melodic line and the inevitable suggestion of superior musicianship associated with that substantial composer. Like "Swinging on a Star," it had its inception in a motion picture, with Rita Hayworth as the singer in *Cover Girl*.

Far below such standards, but winning their full share of applause, were "No Love, No Nothin'," "I Couldn't Sleep a Wink Last Night," "Poinciana," "When They Talk About You," "How Many Hearts Have You Broken?" and "I'm Making Believe." The "Trolley Song" came to the rescue just in time and was a well-established hit long before Judy Garland could be heard singing it on the screen in *Meet Me in Saint Louis*.

Cole Porter made his customary contribution to the better type of popular music. He first gave a new twist to the platitude, "I Love You," sung by Wilbur Evans in the musical comedy, *Mexican Hayride*, and then crashed unexpectedly into the hillbilly list with "Don't Fence Me In," a frankly "corny" tune, popularized by the Andrews sisters on a record and in the motion picture, *Hollywood Canteen*. (A legitimate ancestor might have been the old nursery song, "Polly Wolly Doodle.")

One of the later hits of 1944 was the melodious "I'll Walk Alone" (with benefit of Sinatra) and the Latin-American influence made itself pleasantly felt once more in "Amor, Amor, Amor," which spells love in any language. Musical Americana continued to enliven the stage, with *Bloomer Girl* reflecting the success of *Oklahoma!* and a highly original revue, *On the Town*, bringing Leonard Bernstein into the lighter field, enlarging his equally successful ballet, *Fancy Free*.

Frederic Chopin joined Richard Rodgers at the top of the list of the U.S.'s favourite composers for the year 1945.



Frank Sinatra, singing with the New York Philharmonic at Lewisohn stadium, New York city, Aug. 3, 1943

The Polish patriot, who died in 1849, was suddenly discovered by a huge new audience, chiefly through the film, *A Song to Remember*, which idealized and considerably fictionized his romance with Mme. Dudevant (George Sand), played by Merle Oberon opposite Cornel Wilde's Chopin, with Paul Muni in the background as the composer-pianist's teacher.

Regardless of historical accuracy, *A Song to Remember* profited by the off-screen piano playing of José Iturbi (well established as a Hollywood star), and this attractive motion picture proved to be the first musical biography of the screen to appeal to the large public represented by New York's Radio City Music hall, where the film played for a record-breaking six weeks.

The popularity of Chopin's "Polonaise in A-flat," which began in the movie theatres and continued through the stage musical, *Polonaise*, reached a climax with the popular song, "Till the End of Time," adapted by Buddy Kaye and Ted Mossman, and clearly Tin Pan Alley's hit of the year. (Bing Crosby quite properly objected to the sentimentalizing of an essentially heroic theme, but his crooning records added enormously to the popularity of the song.)

Publishers of popular music stimulated the Chopin craze still further by bringing out simplified versions of his best-known piano pieces, including the spectacular "Polonaise" itself, which created something like a world record

by appearing in 15th place on the list of hits while its offspring, "Till the End of Time," was riding at the top.

Another Chopin composition, the "Fantasie-Improptu in C-Sharp minor," achieved an indirect popularity through the revival of "I'm Always Chasing Rainbows" in a highly anachronistic film called *The Dolly Sisters* (played by those un-Hungarian platinum blondes, Betty Grable and June Haver). The song (already a hit some 25 years before) was credited to Harry Fox instead of its actual adapter, Harry Carroll, with no mention of Chopin whatever.

The famous "Minute Waltz" also received some new attention, with the distinction of having a screen performance in exactly one minute, which is considerably faster than the concert pianists play it.

Rodgers and Hammerstein continued their effective teamwork throughout 1945, with *Oklahoma!* breaking all records for the musical stage and finding an equally successful running mate in *Carousel*, adapted from the *Liliom* of Ferenc Molnar and given a New England setting. This new musical show contained the year's best popular song, "If I Loved You," whose melody might have been written by Johannes Brahms and whose words taught a new lesson to Broadway's lyricists.

The best light musical film of the year, *State Fair*, was also primarily the work of Rodgers and Hammerstein. Two of its songs, "It Might as Well be Spring" and "That's for Me," soon entered the "smash" class, the former eventually winning Hollywood's academy award as the top screen song of the year. At one time both of these numbers appeared in the "Hit Parade" along with "If I Loved You," creating a new record of three out of nine by the same writers in radio's hall of fame. All three showed a distinction of style and individuality of words and music seldom achieved by popular song writers.

Chopin and Rodgers received comparatively little competition from the rest of the popular music of 1945. There was novelty in the pseudopsychological "Accentuate the Positive," whose text showed the skill and humour of Johnny Mercer, but with a melody that merely echoed "Praise the Lord and Pass the Ammunition," with "The Old Gray Mare" as a common ancestor. Words were also more important than tune in the current railroad song, "The Atchison, Topeka and the Santa Fe," which was played to death even before Judy Garland had a chance to exploit it in the film, *The Harvey Girls*. The conventionally catchy "Sentimental Journey" similarly capitalized its lyric rather than its tune.

A reversion to the old-fashioned subject of dreams resulted in three big hits of 1945, headed by "My Dreams are Getting Better All the Time," another example of the importance of words as compared with music. Then came a song called simply "Dream," followed by the more frivolous "I'll Buy that Dream."

Cole Porter's "Don't Fence Me In" carried over from 1944 and was rated by radio's research experts as having the largest "listening audience" of 1945, with Lawrence Tibbett succeeding Frank Sinatra as its high priest. The same composer enjoyed a continuing success for his "Begin the Beguine," now well established as a "standard" favourite. The "Trolley Song" and a few other hits of the preceding year also maintained or increased their popularity, notably "I'll Walk Alone," with less significant additions in "There Goes that Song Again," "I'm Beginning to See the Light" and "A Little on the Lonely Side."

Jerome Kern had his customary hit in "More and More," and an excellent song called "Laura" was helped by a

popular film of the same title, besides showing a quality of words and music considerably above the average. The returning soldiers and sailors received their special tributes from Tin Pan Alley in such songs as "It's Been a Long, Long Time" and "I'm Gonna Love That Guy (Like He's Never Been Loved Before)."

The Calypso trend was emphasized in "Rum and Coca-Cola," a direct importation from Trinidad, whose exact authorship was still the subject of dispute and litigation. A milder stimulant was suggested by "Candy," whose success could not be explained even by its own publisher. "Chickery Chick" was an unimpressive candidate for the nonsense prize of the year, with a late arrival, "Symphony," demanding serious consideration.

A revival of the ancient "Bell Bottom Trousers," with the words cleaned up, paid doubtful respects to the navy, but failed to displace "Anchors Aweigh," which eventually became also a successful film title. Other popular patriotic songs were the "Marines' Hymn" (with a melody from Jacques Offenbach's *Genevieve of Brabant*) and the "Army Air Corps Song," by Robert Crawford, both written long before World War II.

The sensation of 1946 promised to be Irving Berlin's score for *Annie, Get Your Gun*, the musical glorification of sharp-shooting Annie Oakley, produced by the ubiquitous Rodgers and Hammerstein, with the strongly vocal heroine played by Ethel Merman. Three songs from this light opera appeared simultaneously on the "Hit Parade," equalling the producers' own record of the previous year. They were a tender love song, "They Say It's Wonderful," a ribald piece of folk material, "Doin' What Comes Naturally," and an exciting bit of syncopation, "I Got the Sun in the Morning." The same score contained such other successes as "The Girl that I Marry," "Who Do You Love, I Hope" and "You Can't Get a Man with a Gun."

The musical stage received further help from the sophisticated *Billion Dollar Baby*, composed by Morton Gould, revivals of the immortal *Show Boat* of Kern and Hammerstein and Victor Herbert's *Red Mill* and such widely different shows as *Are You With It?*, *The Day before Spring* and *Call Me Mister* (whose outstanding hit was "Along with Me"). Another musical, *Saint Louis Woman*, supplied a successful song called "Come Rain or Come Shine," in the Negro tradition.

The screen also did well by popular music. Jerome Kern's last score, *Centennial Summer*, contained such popular tunes as "All Through the Day" and "In Love in Vain"; Cole Porter was honoured by a film biography called *Night and Day*, containing more than 30 of his songs, in addition to that of the title; Berlin was almost as well represented in *Blue Skies* (without biographical import) and the star of Serge Rachmaninoff shone effulgently upon the Republic production originally titled *Concerto*, but handed over to the box office as *I've Always Loved You*.

Rachmaninoff's *Second Piano Concerto* made him the logical successor to Chopin, Edvard Grieg and Peter Tschaikovsky, with its final theme appearing in several popular songs, of which the most successful was "Full Moon and Empty Arms," adapted by the same Buddy Kaye and Ted Mossman who had formerly helped Chopin and themselves to "Till the End of Time."

Early hits of 1946 included the already established "Symphony," of foreign origin, "It's Been a Long, Long Time," and the naughtily funny "Personality," sung by Dorothy

Lamour in the Bing Crosby-Bob Hope film, *Road to Utopia*. "I'm Always Chasing Rainbows" was joined by the reminiscent "I Can't Begin to Tell You," from *The Dolly Sisters*. In time the U.S. public succumbed to a colourless ditty called "The Gypsy," responding also to "Surrender," "To Each His Own," "Prisoner of Love" (a revival), "I Don't Know Enough about You," "I Don't Know Why" (another revival), "Sioux City Sue" (pure "corn"), "Do You Love Me?" "All the Time" and "One More Tomorrow." The old-fashioned "torch song," "Laughing on the Outside (Crying on the Inside)," had the distinction of a record number of infringement claims, of which one or two threatened to get into court; and a commercial radio jingle, "Chiquita Banana," pioneered as a sheet music seller, besides contributing toward food conservation through the altruism of its sponsor. (See also RADIO.) (S. Sp.)

Music in Industry.—Many thousands of plants in the United Kingdom and the United States were equipped during World War II and the postwar period to distribute music to their various departments. Similarly, commercial enterprises introduced music into their accounting rooms to counteract the boredom of concentration upon figures. There were instances of banks, insurance companies and other similar enterprises whose employees accomplished their daily tasks to the accompaniment of subdued music. There appeared to be a growing enthusiasm among workers for this attractive new element in the daily routine. Music often was extended beyond the work period into lunch hours and rest periods on the theory that the worker, diverted by music, would return to his task with renewed spirit.

General use of music in industry was a direct result of the British government's concern with the welfare of war workers. The British Broadcasting company was called upon by the government to broadcast at certain hours music suitable for industrial plants; it had been found that these plants through lack of familiarity with the problems involved were defeating the purposes of "music-while-you-work" through basic mistakes, chiefly faulty programming.

Beginning in the summer of 1940, the project spread through virtually all English plants in war work and rapidly was taken up by other English industries. U.S. industry soon adopted the plan.

The claim was made that programming could be standardized to meet the varying requirements of almost all industry. Certain fundamentals were known. Fast music did not mean fast work.

A sharply defined melody was preferable to rich orchestration. A slow waltz tempo was favoured a few minutes before the usual midmorning or midafternoon fatigue period.

Instrumental music was preferred, for the listener often was distracted in an effort to follow the spoken word.

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Music Library Association

See SOCIETIES AND ASSOCIATIONS.

Mussolini, Benito

Mussolini (1883–1945), Italian journalist, founder and leader (*Duce*) of the Fascist party, and head of the government of Italy from 1925 to 1943, was born July 29, 1883, in Predappio, province of Forlì. He received sufficient formal education to qualify as a school teacher, but his rebellious and ambitious spirit drew him into the socialist movement, in which he rose rapidly to the editorship of the official organ, *Avanti*, in 1912.

As a socialist leader Mussolini was anticlerical, anti-monarchical, antiparliamentary, an advocate of violence and direct action.

Following his shift to the cause of intervention of Italy in World War I he was expelled from the Socialist party, and founded a new paper, *Il Popolo d'Italia* (October–November, 1914). He served for a time as a Bersagliere, was wounded and returned to his paper, through which he continued his feud with the socialists. The original fascist movement founded in 1919 was composed of revolutionary veterans, but it attracted few adherents among the workmen.

With the influx of reactionary elements after 1920, the movement was transformed; with the connivance of members of Giovanni Giolitti's cabinet its armed squads carried on a civil war against the socialists. The paralysis of parliamentary government and the refusal of the king and the Facta cabinet to agree to proclaim martial law paved the way for the appointment of Mussolini as prime minister and the unopposed march on Rome by the Black Shirts (October, 1922).

After the crisis which arose from knowledge that henchmen of the prime minister were responsible for the murder of the socialist deputy Giacomo Matteotti (June 10, 1924), a series of laws were enacted which transformed the government into a personal dictatorship although the *Statuto* was not formally abolished. Mussolini's most enduring accomplishment was the settlement of the Roman question and the re-establishment of Catholicism as the religion of the state by the Lateran Agreements of 1929. As head of the government Mussolini aligned himself with the monarchy, the church, the propertied classes and attempted to create a new Roman empire. For a time he was remarkably successful in exploiting the new position of Italy in Europe which ensued from the disappearance of the Hapsburg empire and the temporary eclipse of Germany and soviet Russia as military powers. He reached the zenith of his prestige by the conquest of Ethiopia (1935–36).

After the formation of the Rome-Berlin axis (1936) his name and fame were overshadowed by that of Hitler, yet he brought Italy into World War II (June 10, 1940), hoping to gain an empire on the Mediterranean by German victories. The attacks which he ordered in Greece and Egypt failed miserably, forced the Germans into the Balkan and African campaigns, and opened the way for their occupation of Italy. When the Anglo-American armies drove the axis forces out of Africa, Benito Mussolini's fate was sealed.

The king dismissed him after the revolt of dissident fascist leaders in the grand council (July 25, 1943) and had him placed under arrest.

He was liberated from the Gran Sasso by German paratroopers in September, and served until the end of the war as head of a puppet regime, the Italian Social republic.



Mussolini speaking to huge crowds gathered at Turin, Italy, in 1939, when he announced the ten-year military alliance with Germany

It collapsed with the German military defeat, and Mussolini was captured and executed at Dongo by Italian partisans (April 28, 1945).
(H. M. SH.)

Mustard

See SPICES.

Muti, Ettore

Muti (1902-1943), Italian politician and soldier, was born May 22, 1902. He volunteered in the Italian army during World War I, fought with D'Annunzio's troops at Fiume and returned home a bemedalled teen-age hero. Muti joined the fascist ranks before the march on Rome and was known as the "strong-arm" leader of Mussolini's palace guard, although nominally he was ranked as a minor fascist official.

He served as lieutenant colonel in the Ethiopian campaign, participated in the Spanish Civil War and the Italian campaigns in Albania and Greece, becoming one of Italy's most decorated air heroes. Muti's "devotion" to the Fascist party and his ruthless personality were recognized in 1937 when Mussolini named him secretary general of the Fascist party.

When Il Duce resigned in July 1943, it was reported that Muti fled to escape the wrath of his anti-fascist victims. His death was announced by an Italian news agency, Aug. 24, 1943.

Mutton

See MEAT.

Mysticism

See PHILOSOPHY.

Nagano, Osami

Nagano (1880-1947), Japanese naval officer and diplomat, was born in June 1880 at Kochi, Japan. After graduating from the naval academy in 1900, he attended the naval staff college. In 1913 he was a language officer in the United States, where he studied law at Harvard university and took courses at the War college. As naval attaché in Washington from 1920-23, he participated in the Washington naval conference of 1921-22. Known for his shrewd diplomacy, he represented his government at a number of international conferences. At the London naval conference of 1935-36 Nagano sealed the doom of the 5-5-3 ratio; he rejected Pres. Roosevelt's proposal of a 20% reduction, and when his demands for Japanese parity were refused, he led the Japanese delegation from the conference. In 1936 Nagano was appointed minister of the navy in the Hirota cabinet. The following year he was named commander in chief of the combined Japanese fleets. Nagano became chief of staff of the Japanese navy in April 1941. Early Japanese naval successes after Pearl Harbor braced Nagano's reputation as a naval strategist, but subsequent reverses led to his removal as chief of staff in Feb. 1944. Following the defeat of Japan Nagano was indicted as a war criminal; but he died at Tokyo, Jan. 5, 1947, before completion of the trial.

Nahas Pasha, Mustapha

Nahas Pasha (1876-), Egyptian statesman, was a telegraph clerk in his youth, but later qualified in law at Cairo and became a judge. After World War I his activities as a nationalist led to his deportation to Malta, but his exile was brief, and after his return he became chief Wafdist representative in Sarwat Pasha's coalition government. Nahas Pasha became leader of the Wafdist party in Aug.

1927 as well as president of the chamber of deputies. In Feb. 1928 he successfully led the opposition to the projected treaty with Great Britain on the ground that it did not provide for the complete evacuation of British troops from Egypt. He was premier from March to July of that year, and again for a short time early in 1930. In March 1936 he headed the Egyptian delegation to the conference that preceded the signing on Aug. 26 of the Anglo-Egyptian treaty of alliance, by which Egypt attained sovereign statehood. He was premier again in May, holding also the portfolios of the interior and health. In Dec. 1937, following a disagreement between King Farouk and Nahas Pasha concerning mainly a projected bill to protect the constitution and the maintenance by the Wafdists of a "Blueshirt" army, the king dismissed Nahas Pasha and the entire cabinet. In Feb. 1942 Nahas Pasha once again assumed the prime ministership and the posts of minister of the interior and of foreign affairs. Removed from office in 1944, he continued as leader of the Wafdists, and was the object of an unsuccessful assassination plot in April 1946.

N.A.M. (National Association of Manufacturers)

See SOCIETIES AND ASSOCIATIONS.

Nanking

Nanking had been the capital of China from 1928. On Nov. 20, 1937, the Chinese government, pressed by the Japanese attack on near-by Shanghai, formally announced the removal of the capital to Chungking. On Dec. 13 of the same year, Nanking fell to the Japanese.

The Japanese pillaged Nanking savagely for almost five months after its fall. According to neutral estimates, more than 10,000 unarmed persons were killed, and more than 20,000 cases of rape were committed. The rape of Nanking was undoubtedly one of the darkest pages in history.

On March 28, 1938, the Japanese established in Nanking the puppet regime called the Reformed Government of the Republic of China. For a time it was on the same footing with the provisional government in Peiping. On March 30, 1940, both of them were superseded by the National Government of China, headed by Wang Ching-wei. After Wang's death in 1944 he was succeeded by Chen Kung-po. Tried as a traitor, Chen Kung-po was sentenced to death and shot by a firing squad in June 1946.

On Aug. 27, 1945, Lieut. Gen. Leng Hsin of the Chinese army arrived in Nanking to make arrangements for the Japanese surrender. The formal surrender took place in the Central Military academy, Gen. Ho Ying-chin, commander in chief of the Chinese army, representing China, and Gen. Yasutsuga Okamura, commander of the Japanese army in central China, representing Japan.

The Chinese government immediately made arrangements to move the capital from Chungking back to Nanking. On May 5, 1946, a ceremony to celebrate the return of the capital took place, presided over by Generalissimo Chiang Kai-shek.

Nanking was repeatedly bombed during the first few months of World War II. It was also damaged by fighting before the evacuation. According to Mayor Ma Chao-chun, the population dropped from the 1937 figure of 1,189,580 to 667,600, plus 200,000 Japanese at the time of the surrender. Of the 167,254 buildings in prewar Nanking 4,596 were ruined in the war, while 187 new ones were built.

Nanking held its first municipal elections in Oct. 1946, electing a municipal assembly. It remained a municipality

directly under the jurisdiction of the central government. (C. CN.)

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Nansir Shoto

See OKINAWA.

Narcotics and Narcotic Traffic

On Dec. 6, 1945, the Preparatory commission of the United Nations adopted a resolution providing for the creation of a Commission on Narcotic Drugs under the Economic and Social council. This commission was to consist of 15 members representing their respective governments, as follows: China, United Kingdom, United States, U.S.S.R., France, India, Netherlands, Canada, Mexico, Turkey, Egypt, Iran, Yugoslavia, Peru and Poland. It was organized to carry on the work formerly done by the Opium Advisory committee of the League of Nations, and to advise the Economic and Social council on all matters pertaining to policy and application of international conventions in the field of dangerous drugs.

World War II had found the battered League of Nations hanging almost exclusively on opium control as its last shred of international activity. Even axis countries maintained control set up by treaties and promised to submit figures on production and consumption after cessation of hostilities. The two international bodies, the Permanent Central Opium board set up under the Geneva convention of 1925, and the Drug Supervisory body set up under the Limitation convention of 1931, found shelter in Washington, D.C., from which point they received reports from all over the world including those which the axis allowed to be sent from occupied countries such as Norway, the Netherlands, Denmark and Hungary. The one glaring gap in the lack of international control was in the far east after Japanese invasion.

Postwar Re-establishment of Controls.—About 2,000 U.S. army and navy civil affairs officers were lectured and briefed on the necessity of bringing the opium traffic under control in Japan and in those areas formerly dominated by Japan. Gen. Douglas MacArthur issued orders prohibiting the production and manufacture of narcotic drugs and ordered the Japanese to account for production, distribution and consumption of narcotics since 1930.

Narcotic control in Germany was undertaken by the Four Powers under a quadripartite agreement. Control in the U.S. zone was decentralized and placed in the three *Lander* subzones. Little information was forthcoming as to control in the other three zones and it was apparent that a centralized narcotic control system in Germany was desirable in order to prevent illicit trafficking from becoming a major problem in any one of the four zones.

It was evident that during World War II Germany supplied most of its narcotic needs with morphine derived from the manufacture of poppy straw.

Limitation of Production.—The United States congress adopted the Judd resolution, approved July 1, 1944, pursuant to which the government urged all poppy-growing nations to enter into an international agreement to reduce the production of opium to the medical and scientific needs of the world. Copies of this resolution were transmitted to Great Britain (on behalf of India and Burma), Iran, Afghanistan, the U.S.S.R., Turkey, Yugoslavia, China and Mexico. Of those nations, Afghanistan agreed not only to limit the production of the opium poppy but to ban it entirely after March 21, 1945. The government of

Afghanistan declared that "in the interest of international co-operation and because of humanitarian sentiment, it is ready to take this important step."

In May 1946 Iran ordered the production of opium to cease because of a tremendous addiction problem in that country.

The total estimated annual world production of opium in 1946 amounted to about 2,500 tons. It was estimated that in normal times the annual needs for medical purposes had not exceeded 400 tons. The inevitable result of such a system was an annual surplus for the illicit traffic.

Medical Needs.—About 1937, the U.S. government, in co-operation with the opium alkaloidal manufacturers, established a stock pile of opium which was placed in the gold vaults of the treasury department in Washington, D.C. This stock pile, created for use in the event of war, was the only critical and strategic material which was available in the United States throughout World War II in sufficient quantity, particularly within the medical group. The stock pile was of use in assisting members of the United Nations in maintaining control throughout the hostilities. A morphine syrette, developed in the United States and widely distributed in planes, tanks and on the battle front, was greatly responsible for the saving of lives following initial shock and injury.

Far East.—The Japanese began their perpetration of narcotic warfare in China by encouraging production and consumption. A sharp and outstanding illustration was the manufacture in Korea in 1938 and 1939 of a sufficient amount of heroin each year to supply the total medical needs of the world. This heroin was sent to Manchuria for distribution by the Japanese monopoly. The Japanese government reported to the League of Nations under the International Narcotic conventions that no heroin had been manufactured in Korea during those years.

The Chinese government had made remarkable progress in opium eradication and in suppression of the abuse of opium throughout that part of China under control of the national government. Many hospitals were turned over to bring about cure of drug addiction. Each year approximately 1,000 executions occurred for violation of the government antiopium laws.

The smoking opium monopolies maintained by the British in Hong Kong showed a loss to the government. Not more than 1,000 smokers patronized the government shops, whereas the police reported about 90,000 smokers obtained their supplies from illicit sources. This indicated a complete breakdown of the monopoly system. At the beginning of the war in the far east the monopolies maintained by the British in Hong Kong, Malaya Straits Settlements, Borneo and Burma were taken over by the Japanese government and continued in operation. The same held true for the monopolies maintained by the French in Indo-China, by the Dutch government in Indonesia and by the Siamese government. In Nov. 1943 the British and Dutch governments both announced that upon the recapture of their territories from the Japanese, the smoking opium monopolies would not be re-established and the licensed sale of nonmedical opium would be prohibited. The French made a similar announcement respecting Indo-China. In June 1946 the Portuguese government closed opium retail shops in Macao. These commitments had been carried out at the end of the decade except in Burma. However, there was still nonmedical use of opium in India and Siam.

U.S. Illicit Traffic.—Many important international and national narcotic traffickers were convicted through close co-operation with international narcotic police, particu-

larly with the help of the Canadian authorities.

A number of the defendants in the notorious Murder, Inc., were convicted for smuggling narcotic drugs from the Japanese concession in Tientsin into the United States in the baggage of ostensible round-the-world tourists. In approximately one year they smuggled sufficient drugs to supply the needs of 10,000 addicts for that period.

With the cutting off, during World War II, of southern Europe and the far east as sources of supply of raw and prepared opium, Great Britain, Iran, India and Mexico, in the order named, supplanted China, Macao, Yugoslavia, Italy and France as the major bases for opium smuggling operations to the United States. Once shipping was being resumed between European and certain near eastern ports, however, there were indications that narcotic drugs were available in these ports for smuggling to the United States. This seemed particularly true of marijuana (cannabis).

The numerous seizures of Iranian and Indian raw opium on vessels sailing from British ports continued to be of the utmost significance and constituted a serious enforcement problem. A number of the vessels involved in the smuggling of opium into the Atlantic coast area came from British ports. These vessels employed Chinese crews who frequently purchased opium from acquaintances in the large Chinese transient colony in Liverpool and concealed it in innumerable cleverly contrived hiding places on the ships. As soon as customs officers had finished searching one section of a vessel, the Chinese crewmen would remove their supplies of opium from their hiding places and secrete them in the sections of the ship just searched, thus necessitating constant re-search of vessels as long as they remained in port. Occasionally 14 or 15 opium seizures would be made on one vessel in a period of a few days.

Of equal significance appeared to be the increasing number of seizures of raw opium of Indian origin. Iranian opium continued to be the most frequent type seized and constituted the heaviest total.

Drugs available to the illicit traffic continued to be relatively scarce and prices remained extremely high. Morphine sulphate, stolen or diverted from legitimate channels, was more available than heroin in some sections of the U.S., but highly adulterated heroin was obtainable at almost prohibitive prices. Opium was most freely available in the New York area, the Mexican border and southern California.

The Mexican authorities organized expeditions in their annual effort to destroy fields of opium poppies in remote and inaccessible regions. Accompanying each expedition and acting in an advisory capacity was a representative of the United States. The flow of opium from the Mexican states of Sonora, Sinaloa, Durango and Chihuahua into the United States continued, and it was evident that severe measures had to be taken to eliminate the clandestine opium poppy production in Mexico.

The shortage and extremely high price of narcotic drugs continued to lead addicts and peddlers to resort to various methods to obtain supplies from medicinal stocks. There was an increase over the already substantial number of robberies and burglaries of narcotic drug stocks in pharmacies and other registered establishments. These depredations continued to represent a substantial diversion of narcotics, despite the fact that the bureau of narcotics and local police, in co-operation with each other and acting independently, were able to bring about the arrest of

many of the perpetrators of these crimes. There continued to be numerous cases involving forgery of narcotic prescriptions by addicts in attempts to secure drugs. The demands of addicts were met partially by the use of medicinal opium, morphine sulphate and codeine stolen from pharmacies and similar establishments. Other addicts attempted to satisfy their cravings with paregoric or similar preparations containing small quantities of opiates in combination with other medicinal ingredients, or with barbituric acid derivatives, called, in the underworld "yellow jackets," "goof balls," etc.

Addiction.—The rate of addiction fell rapidly throughout the world because of the controls placed on manufacture and distribution by international narcotic treaties. For instance, as a striking example of the fall in drug addiction typical in many places in the world, in the United States during World War I there was one rejection for drug addiction out of every 1,000 men processed; whereas during World War II in processing 12,500,000 men between the 18 to 38 age group only one in every 10,000 was rejected for drug addiction.

Drug Addiction Research.—The Committee on Drug Addiction of the National Research Council conducted a program which had as its primary object the synthesis of drugs, having little or no tendency to cause addiction, which might serve to replace morphine, heroin and other dangerous narcotics in their therapeutic applications. The selection of compounds for clinical trial and addiction studies was made on the basis of pharmacological experiments covering about 200 morphine derivatives, most of which were prepared for the first time. The funds for clinical studies at the University of Virginia, Charlottesville, Va., and for pharmacological studies at the University of Wisconsin, Madison, Wis., were provided by the Rockefeller foundation.

Metopon was one of the many compounds made and studied in this co-ordinated effort. It gave promise of developing into a very satisfactory drug for the control of pain in terminal cancer cases and possibly in other terminal diseases. Chemically, metopon is a morphine derivative. Pharmacologically, it is qualitatively like morphine even to the properties of tolerance and addiction liability. It differs from morphine quantitatively in all of its important actions. Its analgesic effectiveness is at least double and its duration action is about equal to that of morphine. It is nearly devoid of emetic action. In terminal malignancy administered orally, it gives adequate pain relief, with very little mental dulling and without nausea or vomiting. The drug is particularly adapted to terminal cancer cases where home treatment is desirable. It has many psychological advantages over morphine, particularly its advantages over hypodermic injection.

Uniform State Narcotic Drug Law.—To supplement the federal narcotic laws with special reference to certain phases of intrastate traffic, a Uniform State Narcotic law had been adopted in 42 states and the District of Columbia by 1946, and two of the remaining states, California and Pennsylvania, had in effect state narcotic laws of comparable efficacy. Four states, Kansas, Massachusetts, New Hampshire and Washington, had not adopted the uniform law and, in the opinion of the bureau, did not have in effect a state narcotic law comparable in regulatory efficacy with the Uniform State law.

Demerol (Isonipecaïne).—On July 1, 1944, a law was approved extending the application of the federal narcotic laws to the synthetic drug isonipecaïne, which is a chemi-

cally descriptive term for the trade-mark name "Demerol." Under this law isonipecaïne, a substitute for morphine, became subject to the same control from the federal standpoint as was morphine, except that no provision was made for exempt preparations containing isonipecaïne, as in the case of morphine.

While isonipecaïne has no chemical relationship to morphine, it has definite morphinelike physiological characteristics and is habit forming. The substance is identified chemically as 1 methyl-4-phenylpiperidine-4-carboxylic acid ethyl ester.

Other substitutes developed were being carefully scrutinized and studied. The Robertson bill passed by congress in 1946 was designed to bring all future habit-forming drugs creating addiction similar to that caused by morphine and cocaine under strict control.

Marijuana.—The Marijuana Tax act was passed in the United States in 1937 because of widespread abuse and crimes attributed to the smoking of marijuana cigarettes. The users of this drug appeared to be a younger group than morphine users. After passage of the act the drug cannabis virtually disappeared from the practice of medicine. It was deleted from the United States Pharmacopoeia.

The hemp industry in the United States, centred in Wisconsin, Minnesota and a few adjoining states, was protected by allowing the growers to register under the act. The flowering tops containing the resin drug were destroyed in the manufacturing process. When the United States entered World War II, importation of Manila hemp ceased. It was necessary to increase the acreage to provide sufficient hemp for wartime needs. About 47 processing plants were set up in five middle-western states.

Cannabis research was undertaken by a subcommittee of the League of Nations and progress was under way when the war started.

In India cannabis continued to be sold in the same way as opium across the counter. It was also sold in tobacco shops of the regency in Spanish Morocco, French Morocco and French Tunisia. Widespread abuse continued in Egypt, the drug being smuggled from Syria and Lebanon.

Barbiturates.—Because of an upward trend in abusive use, extending to sleeping-tablet suicides, there was a growing demand for stricter control of a group of preparations known as barbitol drugs, such as amytal, luminal, nembutal, etc.

On Oct. 12, 1945, the American Pharmaceutical association called a conference in Washington, D.C., of interested groups to discuss the problems arising from the misuse of barbiturates. Representatives were present from the American Medical association, American Dental association, American Hospital association, United States public health service, United States bureau of narcotics and United States Food and Drug administration.

Discussion was held on barbiturate regulation, barbiturate habituation and tolerance, and the medical pharmaceutical and legal aspects of the problem. Accidental deaths and suicides directly attributable to the effect of the drugs were on the increase.

Control at the state level was recommended. Fourteen states and the District of Columbia had no law regulating the sale and distribution of barbiturates in 1946. The laws in the other states were not uniform, and most of them were believed to be inadequate. (H. J. A.)

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Natal

See SOUTH AFRICA, THE UNION OF.

National Academy of Sciences

See SOCIETIES AND ASSOCIATIONS.

National Archives

See ARCHIVES, NATIONAL.

National Association of Evangelicals

See EVANGELICALS, NATIONAL ASSOCIATION OF.

National Association of Manufacturers

See SOCIETIES AND ASSOCIATIONS.

National Association of State Libraries

See SOCIETIES AND ASSOCIATIONS.

National Budgets

See BUDGETS, NATIONAL.

National Catholic Community Service

See SOCIETIES AND ASSOCIATIONS.

National Catholic Rural Life Conference

See CATHOLIC RURAL LIFE CONFERENCE, NATIONAL.

National Catholic Welfare Conference

See CATHOLIC WELFARE CONFERENCE, NATIONAL.

National Congress of Parents and Teachers

See SOCIETIES AND ASSOCIATIONS.

National Debts

See DEBTS, NATIONAL.

National Defense

See under individual countries.

National Defense Mediation Board

See WAR AND DEFENSE AGENCIES.

National Defense Research Committee

See WAR AND DEFENSE AGENCIES.

National Education Association

See SOCIETIES AND ASSOCIATIONS.

National Finance

See BANKING; BUDGETS, NATIONAL; DEBTS, NATIONAL; GOLD; INCOME AND PRODUCT; TAXATION; WEALTH AND INCOME, DISTRIBUTION OF.

National Forest System

See FORESTS.

National Foundation for Infantile Paralysis

See INFANTILE PARALYSIS.

National Gallery of Art

See ART GALLERIES AND ART MUSEUMS; SMITHSONIAN INSTITUTION.

National Geographic Society

See SOCIETIES AND ASSOCIATIONS.

National Guard, U.S.

The national guard made four outstanding contributions to the United States national welfare between 1937

and 1946. These were: (1) its part in raising the morale of the army after its induction into the national service; (2) its pioneering in motorization; (3) its combat record; and, (4) its preparation for a still larger role in the military history of the United States.

The Morale Factor.—To understand the morale problem which faced the U.S. army at the time that it ceased temporarily to be a strictly professional organization and became for the most part a citizen army, it is necessary to go back to 1927. In that year the record of the army as regards morale was worse than in any other year for which it had collected and published adequate statistics regarding its losses. This situation was apparently a result of post-war pacifism, with its accompanying leanness of appropriations and decline in quantity and quality of enlistments.

As of June 30, 1927, according to the report of the secretary of war, there were 113,041 enlisted men in the regular army. Yet during the preceding 12 months 11,580 men, or 10%, had deserted, and the total losses, other than from death and expiration of enlistments, amounted to 36,769, or about one-third of the year-end total.

In this connection it is worth noting that the U.S. army was the only one which published detailed reports covering all phases of its condition, including items reflecting morale, even when morale was below standard. Nothing reflected more clearly the frankness of the war department than the fact that during that period it went on year after year publishing its discouraging morale statistics, and trying to solve the problems which they revealed. That it made tremendous progress toward that end is shown by the secretary of war's report for 1938, the last peacetime year in which the regular army was still virtually unaffected by emergency inductions and enlistments. In 1938 desertions had fallen to 5,686 although 7,916 enlisted men were so acutely displeased with military life that they purchased their release from the army.

That the national guard made important contributions to the morale and stamina of the U.S. army in World War II is clearly indicated in a detailed comparison of the morale items in the report of the secretary of war for 1938 with similar items in his report for 1941. Just as 1938 was the last normal prewar year for the regular army, so 1941 was the first and only year in which the effect of the new elements brought into the army prior to Pearl Harbor could be evaluated in terms of peacetime conduct and attitudes or, more simply, of morale. Those new elements, of course, were the national guard, reservists and selective service conscriptees.

The regular army of 1938 had 12,472 officers and 163,800 enlisted men. The army of 1941 had at the end of the fiscal year 92,643 officers and 1,361,449 enlisted men. The buildup of that force, however, had been on a slowly rising scale, so that the average monthly enlisted strength was only approximately 750,000. Since the national guard came into service at a more rapid rate than that of the men from selective service, the guard averaged throughout the decade 1937-46 about one-third of the total monthly strength of the army.

On the basis of the average monthly strength for the two years the most significant losses were:

Losses per 10,000 officers	Officers				
	Retired	Resigned	Dismissed	Died of disease	Suicide
1938	153	16	3	26	4
1941	28	1	.5	13	3



National guardsmen of New York's 244th coast artillery regiment were among the first called up for a year's duty in Sept. 1940

Losses per 10,000 enlisted men entering army)	Enlisted Men		Inept or not desired	Deserted	Suicide
	Criminals (convicted in civil courts prior to or after died of disease)	Died of disease			
1938	66	15	75	347	4
1941	38	9	27	168	1

It was not claimed that this striking improvement in health, outlook and general fitness for the task at hand was due solely or even preponderantly to the fact that the national guard had been inducted into the army during this period. The guard, however, must be credited with an important part in that achievement. It was certainly not unreasonable to assume that these men and officers, who had prepared themselves for military service virtually at their own expense and who had had higher-than-average standing in their own communities, played a more than average role in the spectacular improvement in the army's morale.

In this connection it was to be borne in mind that the national guard furnished 299,045 of its own officers and men to the federal service, and in addition, prior to June 30, 1941, the national guard divisions absorbed 120,891 selective service conscriptees and had full responsibility for their training. In other words the guard furnished through its own membership slightly more than two-sixths of the army's strength for 1941, and in addition, as part of the army, it had charge of almost one-sixth of that strength through its absorption of conscriptees.

The total average monthly strength of the guard, therefore, plus its absorbees, amounted to approximately one-half of the total average monthly strength of the army of 1941.

Combat Record.—When the final pay-off came in actual combat, the national guard divisions did their full share in upholding the glory of U.S. arms.

National guard divisions were in the assault forces in every important theatre, and the average losses for these divisions were far in excess of the average losses for all the combat divisions, and about the same as those of nine regular army divisions.

The average combat loss per division for all divisions, exclusive of the national guard, in all theatres of the war was 6,176 per division, and for the 19 national guard divi-

sions, 9,166. The average for the nine regular divisions was 14,541. The average for the nine national guard divisions most heavily employed was 14,345.

The statistics covering losses of the nine regular divisions and for the nine national guard divisions most heavily engaged follow:

Regulars		National Guard	
4th Div.	22,429	34th Div.	20,906
9th Div.	19,889	29th Div.	20,754
1st Div.	18,617	30th Div.	18,586
2nd Div.	16,127	35th Div.	15,953
3rd Div.	15,319	28th Div.	13,951
8th Div.	13,791	36th Div.	10,302
5th Div.	11,813	26th Div.	10,243
7th Div.	7,977	45th Div.	9,685
6th Div.	4,910	32nd Div.	8,727
Total	130,872	Total	129,107

The ten divisions, exclusive of both national guard and regular army divisions, which suffered next after the regular divisions are given below, alongside the losses of the remaining ten national guard divisions:

Next Ten		Remaining National Guard	
80th Div.	16,608	43rd Div.	6,982
79th Div.	15,752	27th Div.	6,800
83rd Div.	15,291	37th Div.	6,379
90th Div.	13,902	44th Div.	5,250
106th Div.	9,900	Americal Div.	4,892
101st Air	8,687	41st Div.	4,434
96th Div.	8,655	38th Div.	3,439
78th Div.	8,511	40th Div.	2,864
77th Div.	7,665	33rd Div.	2,282
84th Div.	7,365	31st Div.	1,722
Total	112,336	Total	45,041

Postwar Plans.—The national guard, organized under the act of June 4, 1920, actually operated during the period 1937-46 under substantial amendments enacted in 1933. For the postwar period national guard improved standards were adopted. On Oct. 13, 1945, Secretary of War Robert Porter Patterson approved new policies with regard to the organization and training of units. In Jan. 1946, an improved supply procedure was adopted. This was to be a full scale balanced force capable of instant action on the very day that any nation might hurl its war missiles against the United States. In Feb. 1946 allotments of units on the new troop basis began to be made to the states and the summer of 1946 saw the actual commencement of organization.

The daily status report on federally recognized national

* Units	Inducted and trained	Service	At end of war	Returned to U.S.	Date of inactivation
26th Inf. Div. (Mass.)	Jan. 16, 1941 Camp Edwards, Mass.	France, Belgium, Luxembourg, Germany	3rd army (Austria)	Dec. 28, 1945	Dec. 29, 1945
27th Inf. Div. (N.Y.)	Oct. 15, 1940 Fort McClellan, Ala.	Gilbert Is., Marshall Is., Marianas, Ryukyus, Japan	10th army (Okinawa & Ie Shima)	Dec. 31, 1945	Dec. 31, 1945
28th Inf. Div. (Pa.)	Feb. 17, 1941 Indiantown Gap, Pa.	France, Belgium, Luxembourg, Germany	3rd army (Germany)	Aug. 2, 1945	Oct. 27, 1945
29th Inf. Div. (Md., D.C., Va.)	Feb. 3, 1941 Fort George G. Meade, Md.	France, the Netherlands, Germany	9th army (Germany)	Jan. 16, 1946	Jan. 17, 1946
30th Inf. Div. (Ga., N.C., S.C., Tenn.)	Sept. 16, 1940 Fort Jackson, S.C.	France, Belgium, the Netherlands, Germany	9th army (Germany)	Aug. 21, 1945	Nov. 25, 1945
31st Inf. Div., (Ala., Fla., La., Miss.)	Nov. 25, 1940 Camp Blanding, Fla.	New Guinea, Morotai, Philippines	8th army (Mindanao, P.I.)	Dec. 18, 1945	Dec. 21, 1945
32nd Inf. Div. (Mich., Wis.)	Oct. 15, 1940 Camp Livingston, La.	New Guinea, Morotai, Philippines	8th army (Luzon, P.I.)	(Inactivated overseas)	Feb. 28, 1946
33rd Inf. Div. (Ill.)	March 5, 1941 Camp Forrest, Tenn.	New Guinea, Morotai, Philippines	6th army	(Inactivated overseas)	Feb. 5, 1946
34th Inf. Div. (Ia., Minn., S.D.)	Feb. 10, 1941 Camp Claiborne, La.	Tunisia, Italy	5th army (Italy)	Nov. 3, 1945	Nov. 3, 1945
35th Inf. Div. (Kan., Neb., Mo.)	Dec. 23, 1940 Camp J.T. Robinson, Ark.	France, Luxembourg, Germany, Belgium, the Netherlands	9th army (Germany)	Sept. 10, 1945	Nov. 30, 1945
36th Inf. Div. (Tex.)	Nov. 25, 1940 Camp Bowie, Tex.	Italy, France, Germany, Austria	7th army (Austria)	Dec. 15, 1945	Dec. 15, 1945
37th Inf. Div. (Ohio)	Oct. 15, 1940 Camp Shelby, Miss.	Munda, Bougainville, Philippines	8th army (Luzon, P.I.)	Dec. 15, 1945	Dec. 18, 1945
38th Inf. Div. (Ind., Ky.)	Jan. 17, 1941 Camp Shelby, Miss.	New Guinea, Philippines	8th army (Luzon, P.I.)	Nov. 9, 1945	Nov. 10, 1945
40th Inf. Div. (Calif., Utah)	March 3, 1941 Camp San Luis Obispo, Calif.	New Britain, Philippines, Korea	6th army (Luzon, P.I.)	April 5, 1946	April 7, 1946
41st Inf. Div. (Idaho, Mont., Ore., Wash., Wyo.)	Sept. 16, 1940 Fort Lewis, Wash.	New Guinea, Philippines, Neth. E.I.	6th army (Mindanao, P. I.)	(Inactivated overseas)	Dec. 31, 1945
43rd Inf. Div. (Conn. Me., R.I., Vt.)	Feb. 24, 1941 Camp Blanding, Fla.	Russell Is., New Guinea, Solomons, Philippines, Japan	6th army (Luzon, P.I.)	Oct. 9, 1945	Nov. 1, 1945
44th Inf. Div. (N.J., N.Y.)	Sept. 16, 1940 Fort Dix, N.J.	France, Austria, Germany	7th army (Austria)	July 20, 1945	Nov. 30, 1945
45th Inf. Div. (Colo., N. M., Okla.)	Sept. 16, 1940 Camp Barkley, Tex.	Sicily, Italy, France, Germany	7th army (Germany)	Aug. 3, 1945	Dec. 7, 1945
Americal Div. (N.D., Ill., Mass.)	Activated May 1, 1943 in Pacific theatre	Guadalcanal, Bougainville	6th army (Cebu, P.I.)	Dec. 9, 1945	Dec. 12, 1945

guard officers showed that 17,752 national guard officers were inducted into the federal service and that on June 28, 1946, 8,584 of them were still on active duty. The report follows:

Grade in which inducted	Total number inducted	Separated (Federal recognition terminated after induction)	Inactive (Returned to state control)	Active (Still in federal service)
Major general	21	11	6	4
Brigadier general	74	28	29	17
Colonel	273	91	100	82
Lieutenant colonel	1,100	276	366	458
Major	1,379	346	405	628
Captain	5,114	1,124	1,527	2,463
First lieutenant	5,046	1,106	1,372	2,568
Second lieutenant	4,745	1,071	1,310	2,364
Total	17,752	4,053	5,115	8,584

The average of advances in grades of inducted officers was:

Second lieutenants	2.7	Grades
First lieutenants	2.	Grades
Captains	1.5	Grades
Majors	1.1	Grades
Lieutenant colonels	.5	Grades
Colonels	.08	Grades
Brigadier generals	.00	Grades
Major generals	.00	Grades

One brigadier general became a lieutenant general, and three lieutenant colonels became major generals. Nine second lieutenants advanced five grades, and 253 advanced four.

Inducted under national guard commissions were the following:

Grade in which inducted	Total number inducted	Separated (Federal recognition terminated after induction)	Inactive (Returned to state control)	Active (Still in federal service)
Captain	13	1	3	9
First lieutenant	213	31	52	130
Second lieutenant	2,942	610	782	1,550
Total	3,168	642	837	1,689

For the above the grades on June 28, 1946, were: 3 colonels, 92 lieutenant colonels, 419 majors, 901 captains and 274 first lieutenants.

The grand total for induction of officers and commissioned enlisted men from the national guard follows:

Total number inducted	Separated (Federal recognition terminated)	Inactive (Returned to state control)	Active (Still in federal service)
20,920	4,695	5,952	10,273

The national guard thus contributed materially to the war effort. Of the 299,045 officers and men inducted in 1940 and 1941 the majority belonged to combat divisions and 111,596 belonged to nondivisional units such as separate artillery battalions, anti-aircraft, medical, engineer and similar organizations. These were scattered over the globe and their combat records were merged in the general history.

The service of national guard divisions is indicated in the accompanying table, above. (B. B. M.)

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National Housing Agency

See HOUSING.

National Income and National Product

See INCOME AND PRODUCT.

National Insurance

See SOCIAL SECURITY.

Nationalities, Minority

See MINORITIES.

258 National Labor Relations Board

The National Labor Relations act was signed into law by Pres. F. D. Roosevelt on July 5, 1935, and declared constitutional by the supreme court in a series of test cases on April 12, 1937. As of July 1, 1946, nearly 90,000 cases, involving millions of employees, had been docketed with the three-man board charged with its administration.

The act was limited; it was not proposed as a cure-all for strikes. It was concerned solely with disputes arising over issues of union recognition and antiunion discrimination.

Of the 89,472 cases filed with the National Labor Relations board, 48,357 concerned questions of conflicting claims of representation and the remaining 41,115 involved allegations of unfair labour practices.

The law applied to industries with materials, products or services moving directly across state lines or affecting the operations of other companies engaged in interstate activity. It did not cover employees of federal, state or municipal governments, nor did it apply to agricultural labourers engaged in activity on a farm. Likewise, it did not have jurisdiction over employees covered by the Railway Labor act.

The board established its national headquarters in Washington, D.C., where also were located its legal staff, hearing examiners, administrative personnel and information office. It also established regional offices in 20 key cities, each responsible for servicing a particular area. Outside the continental United States, the board set up offices in Hawaii and Puerto Rico.

Each regional office was placed under the supervision of a regional director, with a staff of investigators and attorneys to assist him.

The heart of the act was found in its section 7, containing a general summary of the rights guaranteed to workers. It stated that "employees shall have the right to self-organization, to form, join, or assist labor organizations, to bargain collectively through representatives of their own choosing, and to engage in concerted activities, for the purpose of collective bargaining or other mutual aid or protection."

In order to protect workers in the exercise of these rights the act specifically provided for prevention of unfair labour practices (section 8), and selection of representatives for collective bargaining (section 9).

Prevention of Unfair Labour Practices.—Under the act employers were forbidden to engage in any of the five unfair labour practices outlined below:

"1. To interfere with, restrain, or coerce employees in the exercise of the rights guaranteed in section 7."

For example, the act declared it illegal for an employer to (1) discourage employees by any means from joining or forming unions; (2) to question employees as to their union membership or activity; or (3) prevent legitimate union activity on company property, provided such activity was confined to the workers' own time. As of July 1, 1946, a total of 3,797 such allegations had been filed with the board.

"2. To dominate or interfere with the formation or administration of any labor organization or contribute financial or other support to it: provided, that subject to rules and regulations made and published by the board pursuant to section 6 (a), an employer shall not be prohibited from permitting employees to confer with him during working hours without loss of time or pay."

Under this section company-dominated unions or organizations controlled by the employer were banned. For example, the board declared the following sort of conditions violations of this section: (1) an active part by management in forming the organization; (2) pressure by management on workers through company officers to join an organization; (3) management provision of the controlled organization with free publications, eating facilities, etc.; and (4) management favoritism of one organization as opposed to another. Charges alleging violation of the above section had been cited in 5,455 instances.

This section did not bar formation by employees of an independent union or an organization limited to employees of a single company unless it was shown to be dominated, interfered with, contributed to or supported in any way by the employer.

"3. By discrimination in regard to hire or tenure of employment or any term or condition of employment to encourage or discourage membership in any labor organization: Provided, that nothing in this act . . . shall preclude an employer from making an agreement with a labor organization (not established, maintained, or assisted by any action defined in this act as an unfair labor practice) to require as a condition of employment membership therein, if such labor organization is the representative of the employees as provided in section 9 (a), in the appropriate collective bargaining unit covered by such agreement when made."

Under this section the board held it illegal for an employer to: (1) discharge or demote an employee because of his union membership or activity; (2) refuse to hire qualified applicants because of previous union membership or activity; (3) discriminate against union employees by holding back wage increases, by layoff or assignment of more difficult or disagreeable work; and (4) refuse to reinstate an employee laid off or discharged for union activity, or to demand that he give up his union membership in order to be reinstated. Violations of the above section had been charged in 27,113 cases by July 1, 1946.

This section did not affect the employer's right to discharge, transfer, layoff or otherwise change the conditions of employment of a worker for just cause such as disobedience or inefficiency.

"4. To discharge or otherwise discriminate against an employee because he has given testimony under this act."

Charges alleging violation of the above section had been cited in 461 cases.

"5. To refuse to bargain collectively with the representatives of his employees, subject to the provisions of section 9 (a)."

For example, the board found evidence of lack of good faith in bargaining on the part of management under such circumstances: (1) where management refused to negotiate with the representatives chosen by the employees in accordance with section 9 (a) of the act; (2) where management refused to put an agreement in writing and sign it; (3) where management engaged in unfair labour practices during negotiations; (4) where management rejected the union's proposals without submitting counterproposals or attempting to reconcile the differences; (5) where management failed to have its representatives available for conferences with the union at reasonable times and places or failed to appoint representatives with power to reach agreements; and (6) where management refused to consider grievances or disputes arising out of interpretation or administration of a collective contract. On July 1, 1946, 13,361 charges alleging violation of the above section had been docketed.

Procedure in Unfair Labour Practice Cases.—Charges could be filed by any worker who believed that his employer had committed any of the illegal practices. They could be filed by himself or by his union on his behalf, with the regional director with jurisdiction over the area where the alleged illegal act occurred. Of the unfair labour practice charges brought to the board's attention during its first ten years, 14,673 were filed by the Congress of Industrial Organizations; the American Federation of Labor filed 13,770; individuals accounted for 3,306; and 1,905 were filed by unaffiliated unions.

As soon as a director received a charge, he notified the employer of the nature of the allegations in the charge, the name of the person or organization making it and asked him to submit a written statement of his position in respect to the allegations. The director then assigned the case to a field examiner. During this investigation the charges might be adjusted, withdrawn, dismissed or otherwise closed without formal action.

The board endorsed and stressed the use of informal procedures for the achievement of results consistent with public policy. This was evidenced by the fact that of the total 41,115 charges filed with the board, more than 90% were disposed of informally—without the necessity of hearings, decisions or subsequent litigation. If the charges were found to be well grounded and the case was not settled by adjustment, a complaint was issued and a public hearing held before a trial examiner appointed by the board. Following this hearing the trial examiner served upon the parties and sent to the board in Washington, D.C., his findings and recommendations. At this point the case was transferred to Washington. Where compliance was not secured, the aggrieved party could file a statement of exceptions and briefs and could request an oral argument before the board. Upon the basis of the whole record in the case the board then made its decision.

Authority to issue such cease and desist orders was provided in section 10 (c) of the act. Therein the board was authorized, in order to remedy unfair labour practices committed, to issue cease and desist orders and to take such affirmative action, including reinstatement with or without back pay, as would effectuate the policies of the act. Of the total of more than 11,000 formal decisions issued by the board in the decade 1937-46—comprising more than 64 bound volumes—2,600 concerned employer unfair labour practices. To remedy such illegal practices the board ordered the reinstatement of more than 300,000 employees; some with back pay. These compensatory pay awards totalled nearly \$11,000,000. Nearly 2,000 company unions were ordered disestablished. In 5,000 cases collective bargaining was ordered, while in 7,200 cases notices of compliance with board decisions were directed to be posted. These posted notices informed employees that they were free to engage in collective activity without interference, as guaranteed by the act.

Decisions and orders of the board were not self-enforceable. There were no penalties or fines. Either the company or the board might petition the appropriate circuit court of appeals for enforcement. Following this either party might petition the supreme court for review. It was only after a court had upheld a board order and an employer had refused to comply that he might be held in contempt of court and subject to court penalties.

More than 600 board cases were litigated in the various circuit courts of appeals and in the supreme court. In the circuit courts 346 of these were upheld in full, 73 were set aside, and 167 were modified. Of the 52 that reached

the supreme court, board orders were enforced in 48 cases; in only 2 cases were board orders set aside.

Selection of Representatives for Collective Bargaining.—Section 9 (a) of the act provided that "representatives designated or selected for the purpose of collective bargaining by the majority of the employees in a unit appropriate for such purposes, shall be the exclusive representatives of all the employees in such unit for the purpose of collective bargaining in respect to rates of pay, wages, hours of employment, or other conditions of employment: provided, that any individual employee or a group of employees shall have the right at any time to present grievances to their employer."

During the decade the board conducted nearly 30,000 elections and cross checks. The importance of self-determination to the individual worker was demonstrated by the consistently high percentage of eligible employees who actually voted. Throughout this period nearly 7,000,000 workers, or more than 85% of those eligible to vote, actually cast ballots in the elections.

The workers voted for the union of their choice in much the same manner as in a political election. The National Labor Relations board took the position that whether employees selected a bargaining representative or what bargaining representative they selected was the exclusive concern of the employees. Employers, therefore, were expected to observe a policy of strict neutrality both during and before an election and to refrain from influencing or inhibiting the will of employees. The board followed the principle of majority rule; in each case it decided whether the appropriate unit should be the employer unit, plant unit or subdivision thereof.

Investigation of a representation claim was usually initiated by the filing of a petition in the regional office. As of July 1, 1946, 48,357 of these requests for board determination of representatives had been filed. The union was required to produce proof, usually in the form of signed applications for membership, actual dues records or signed authorizations designating the union as the bargaining representative. An amendment of 1939 to the board's rules and regulations provided that an employer might file a petition if two or more unions each claimed to represent a majority of his employees.

In the first ten years of board operation 17,134 petitions were filed by the C.I.O.; the A.F.L. filed 16,019; unaffiliated unions accounted for 4,993; and employers filed 408.

The board devised and made available to the parties several types of procedures through which representation disputes might be resolved without recourse to formal proceedings. These informal arrangements were commonly known as consent cross-check, consent election, stipulated cross-check and stipulated election.

Recognition Agreement.—The simplest type of adjustment of representation cases was the outright recognition agreement. It was signed by both employer and the union and, describing the unit covered, stated that both parties agreed that the union represented a majority of the employees, and that no other labour organization claimed representation in that unit. Furthermore, the employer undertook to recognize and bargain with the union without further proceedings. This agreement was subject to the approval of the regional director.

Consent Cross-Check.—As implied in the name, the consent cross-check was a procedure whereby the field examiner or regional director determined whether or not the

union represented a majority by checking the number of signed union cards against the names on the pay roll furnished by the employer.

Stipulated Cross-Check.—The stipulated cross-check differed from the consent cross-check only in that the parties agreed that the board in Washington should finally dispose of the case either by a formal certification in the event the union won or by a formal dismissal if the union was unsuccessful.

Stipulated Election.—Likewise, the stipulated election provided that the agreed-upon election should be the basis of a formal decision by the board instead of an informal report by the regional director. By the same token, the stipulated election procedure designated the board rather than the regional director to make final determination of questions raised concerning the election.

The informal procedures outlined above accounted for more than 76% of the election cases handled in the first ten years of the board's operation. Of the 38,000 election cases handled, 18,900 were adjusted by informal procedures entirely agreed upon by the parties; 13,300, or 35%, by the consent election; 2,950, or 8%, by the consent cross-check; and 2,650, or 7%, by the recognition agreement.

Prehearing Election.—In many cases the board found that parties were not using the informal procedures because they disagreed over relatively minor issues; e.g., eligibility of a fringe group of employees. Thus, even though they were in complete agreement over practically all the election details, very frequently they went to hearing and awaited a formal decision by the board. To remedy this situation the board amended its rules and regulations to make it possible for representation elections to be conducted in certain types of cases without awaiting a formal direction of election by the board in Washington. If, after the election, the parties wished a hearing and a board determination of the unresolved issue, such hearings were held, or the parties might abide by the results of the election and waive formal proceedings.

If the parties failed to agree on use of the above consent methods, the case proceeded to a hearing and, finally, to a formal board decision either directing an election to be held or dismissing the petition. In directing that an election be held the board's decision set forth the bargaining unit to be voted, the name or names of the unions to appear on the ballot and the period in which the election was to be held. If a majority of those voting selected the union, the board thereupon certified that union to represent the employees in the unit agreed on; if the union failed to receive a majority vote the petition was dismissed by the board.

As of July 1, 1945, affiliates of the C.I.O. had been successful in 10,752 elections; American Federation of Labor unions were the victors in 9,093 elections; independent unions were selected in 2,612 balloting; and no union was chosen in the remaining 4,516 elections.

Contribution to the U.S. War Effort.—The board's contribution to U.S. national welfare throughout the war period continued to be, first, the elimination of unfair labour practices which impeded the acceptance of sound collective bargaining practices, and second, the prompt determination of disputes as to employees' choice of their bargaining agents. In essence, the board recognized that every unsettled question of majority representation and every allegation of unfair labour practice constituted a potential impairment of production and morale which demanded immediate attention. Tested and accepted, its services were

available to resolve such disputes through resort to its orderly and peaceful procedures. In this way the board received and resolved unsettled and highly explosive situations in new and expanding plants affected by the huge impact of World War II upon U.S. industry.

In addition to discharging these duties, the board conducted strike polls, a responsibility assigned it by the War Labor Disputes act, and protected the right of employees affected by the merger of domestic telegraph carriers under an amendment to the Communications act of 1934. In the postwar period the board no longer conducted such strike polls, which were apart and separate from the polls for union representation conducted by the board.

Trends.—Of the 1,400 cases being filed monthly with the board at the end of the decade 1937-46, 1,000 concerned conflicting representation claims and the remaining 400 unfair labour practices. Until 1945 the rise in the ratio of representation cases to unfair labour practice cases continued a trend begun some years previously. In 1937, for example, the unfair labour practice cases comprised 71% of the cases filed with the board, as against 29% representation cases. The trend to representation cases started in 1941, when such cases had climbed to 47.4% of the cases filed. That year marked the beginning of a great increase in the number and proportion of representation cases, which continued throughout the succeeding years. After V-J day, however, the trend has been toward unfair labour practices and, as of July 1, 1946, such cases comprised 33% of those docketed. (See also LABOUR UNIONS; LAW; STRIKES AND LOCK-OUTS.) (P. M. Hg.)

National Lawyers Guild

See SOCIETIES AND ASSOCIATIONS.

National League of Women Voters

See SOCIETIES AND ASSOCIATIONS.

National Mediation Board

The National Mediation board, an independent federal labour agency in the United States, was established in 1934 by amendment of the Railway Labor act of 1926. The principal function of the board was to seek, through mediation, the settlement of disputes over wages and working conditions between railroad or air transport carriers and their employees. The board also investigated disputes among a carrier's employees as to who should represent them in collective bargaining negotiations. In such cases the board by secret elections or other means ascertained the employees' choice. During the period 1937-46 the board disposed of 2,177 cases dealing with disputes over changes in wages or working conditions and handled 1,424 representation cases.

Amendments, also enacted in 1934, strengthened the right of railroad employees to organize unions of their own choice without interference, influence or coercion by their employers. These amendments were particularly helpful to the nonoperating employees—shop mechanics, clerks, trackmen and similar groups of workers who were not so strongly organized as the operating or train and engine service employees. These nonoperating workers in increasing numbers abandoned company unions which were frequently dominated by the railroad employer and joined national labour organizations representing their respective crafts. By 1946 the mediation board reported that agreements concluded by national unions, such as those comprising machinists, boilermakers, sheet-metal workers and car builders and repairmen, governed wages and working conditions for these crafts on more than 90% of the coun-

try's railroad mileage, as against from 65 to 75% a decade earlier. The total number of railroad labour agreements on file with the mediation board in 1946 exceeded 4,600; of that number 88% had been negotiated by unions national in their scope.

The growth of unions which were completely free from employer influence contributed to the trend toward national, rather than local, collective bargaining between railroad workers and management. In 1937, 1941, 1943 and 1946 union demands for increased wages were handled by the mediation board in national conferences involving all the major railroads and most of their organized employees. Except in 1937, however, these wage cases were not adjusted through mediation, and it was necessary for the president of the United States to appoint impartial fact-finding boards to investigate the controversies and formulate recommendations for their settlement. On two occasions—in 1943 and 1946—the government, confronted with threatened work stoppages on the part of some of the unions, was forced to seize and operate the railroads for short periods of time. This action averted a wartime strike in Dec. 1943 but failed to halt a two-day stoppage in May 1946 which, for the first time in the nation's history, completely paralyzed rail transportation. With this exception, railroad operations, on a broad scale, were not marred by work stoppages throughout the period 1937–46.

Common carriers by air engaged in interstate or foreign commerce were brought within the coverage of the Railway Labor act in 1936. Few cases involving employees of air transport companies came before the mediation board prior to 1941. Subsequent expansion of the industry, coupled with more intensive efforts to unionize air-line pilots, mechanics and other ground-service personnel greatly increased the demand for the board's services by 1946. In that year more than 100 labour agreements between air-line carriers and their employees were in effect, as compared with less than 10 such agreements in 1937.

National Railway Labor Panel.—This agency was created by executive order of the president for the war period as an adjunct to the mediation board. Under the regular procedures of the law the mediation board advised the president of only such unsettled controversies where employees, by imminent strike action, threatened an interruption to interstate commerce. To enable rail and air employees to abide by their no-strike pledge, the chairman of the National Railway Labor panel was authorized to appoint from a roster of about 20 disinterested individuals panel boards to hear disputes concerning which employees signified their intention to refrain from any action inimical to the war effort. Approximately 40 such boards were created under this procedure. The chairman of the panel was also authorized to determine the permissibility, under the government's wage stabilization program, of voluntary (nondispute) applications for wage changes affecting employees covered by the Railway Labor act. (See also RAILROADS.) (N. M. Bz.)

National Monuments

See NATIONAL PARKS AND MONUMENTS, U.S.

National Museum

See SMITHSONIAN INSTITUTION.

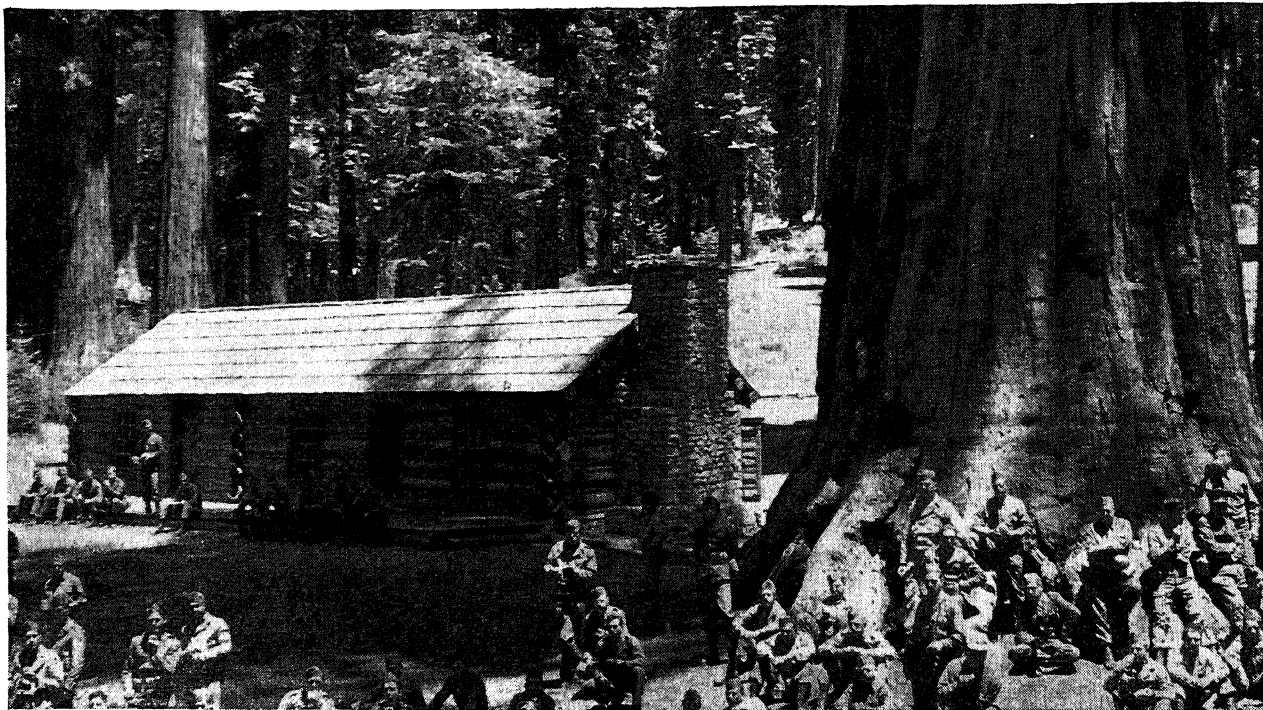
National Parks and Monuments, U.S.

In many ways the decade 1937–46 involved a crucial test of the national park idea in the United States. The national parks, national monuments, and other units of the National Park system came through World War II

virtually intact, despite the need for varied uses of these areas in the interest of the prosecution of the war. During the war period particularly there was developed a heightened public appreciation of the significance of the national parks and monuments as remnants of the original U.S. scene and as reminders of the nation's historic past. Nearly 8,000,000 men and women of the armed forces visited them, thereby gaining a greater knowledge of the aesthetic and cultural values of this portion of the federal estate. Visitors in this period totalled approximately 143,000,000. In the opening travel year of the decade (Oct. 1, 1936 to Sept. 30, 1937), 15,133,432 visitors were recorded. From then until World War II travel rose almost steadily, a peak of more than 21,000,000 being reached in 1941. The low occurred in 1943, at the time of greatest travel restrictions, when visitors totalled 6,908,749. There followed a gradual upswing until V-J day, following which, for the last several weeks of the 1945 travel year, vacationers thronged to the parks and monuments, taxing to the utmost the limited wartime facilities available. In some areas visitors had to seek overnight accommodations at points outside the parks and monuments. Later, park and monument staffs and concession operations approached a normal peacetime basis. Nevertheless, taking care of the approximately 21,682,000 visitors during the 1946 travel year, the largest annual travel on record thus far, presented a major problem. In the spring of 1946 the National Park service, desirous of having visitors enjoy their stay in the parks and monuments to the utmost, advised prospective travelers to make advance reservations for accommodations and, if possible, to plan their trips so as to avoid heavy peak loads of travel on weekends and holidays. The fact was also stressed that many of these areas were ideal vacation spots in the spring and fall and not as heavily visited during those seasons as in the summer months. The great bulk of travel, however, continued to come in the three months of July, August and September.

Considerable progress was made during the decade in rounding out the National Park system. On Jan. 1, 1937, the number of units totalled 139, with a combined area of approximately 17,500,000 acres. By the end of 1946 the system contained 169 units with a combined area within the authorized boundaries of approximately 21,000,000 acres, of which about 600,000 acres were in private ownership or the property of state or other local governments. This property, so owned when the areas were added to the National Park system, presented a stumbling block to the proper planning of future developments, particularly insofar as visitor facilities were concerned. Uses being made of some of this nonfederal property were in conflict with established national park standards and jeopardized the natural and historic values of the parks and monuments. Plans were formulated for the orderly acquisition of these lands, by purchase at prices based on impartial appraisals or, wherever possible, by exchange for other lands in government ownership. Acquisition by purchase was contingent upon congressional appropriations.

Of the total of 27 national parks in existence at the close of 1946, the following were established during the decade: Big Bend National park, Tex., containing approximately 700,000 acres of spectacular mountain and desert country in the great bend of the Rio Grande; Isle Royale National park, Mich., largest island in Lake Superior and distinguished for its wilderness character; Kings Canyon National park, Calif., a rugged region dominated by the two enormous canyons of the Kings river and the summit



Yosemite National Park, Calif., showing U.S. soldiers lunching among the sequoias in the Mariposa grove of big trees, in 1943

peaks of the High Sierra (the former General Grant National park, established in 1890, with its giant sequoias, was a detached section of this park); Mammoth Cave National park, Ky., long known as one of the seven wonders of the new world; and Olympic National park, Wash., another mountain wilderness approximately 848,212 acres in extent and noted for its fine remnant of Pacific Northwest rain forests, active glaciers and rare Roosevelt elk. Included in Olympic was the former Mount Olympus National monument.

Under authority of the Antiquities act of 1906, and in a few instances by specific acts of congress, the following 16 national monuments were established after 1936: Ackia Battleground (Miss.); Andrew Johnson (Tenn.); Appomattox Court House (Va.); Badlands (S.D.); Capitol Reef (Utah); Channel Islands (Calif.); Fort Frederica (Ga.); Fort Laramie (Wyo.); Homestead (Neb.); Jackson Hole (Wyo.); Organ Pipe Cactus (Ariz.); Pipestone (Minn.); Tuzigoot (Ariz.); Whitman (Wash.); Zion (Utah); and Santa Rosa Island (Fla.). Congress by act of July 30, 1946, authorized the abolishment of the last-mentioned area and the transfer of its land to Escambia county for local recreational use. Another national monument, Lewis and Clark Cavern, was abolished by act of congress of Aug. 24, 1937, and the land therein was transferred to the state of Montana for park purposes.

Other areas added to the National Park system during the decade were Richmond National Battlefield park, Va.; Thomas Jefferson memorial in the District of Columbia; and ten national historic sites as follows: Adams mansion (Mass.); Atlanta campaign (Ga.); Federal Hall memorial (N.Y.); Fort Raleigh (N.C.); home of Franklin D. Roosevelt (N.Y.); Hopewell village (Pa.); Manassas National Battlefield park (Va.); Old Philadelphia Custom House (Pa.); Salem Maritime (Mass.); and Vanderbilt Mansion (N.Y.). These national historic sites were designated by the secretary of the interior under authority of the Historic Sites act of 1935, and were federally owned. In addition, seven other sites, not in federal ownership, were designated

by the secretary of the interior. These were Gloria Dei (Old Swedes') church and Independence hall (Pa.); Jamestown (Va.); McLoughlin house (Ore.); Saint Paul's church (N.Y.); San Jose mission (Tex.); and Touro synagogue (R.I.). Under co-operative agreements with the owners, the National Park service continued to aid in the program of preserving and interpreting the nonfederal sites to the public.

Fort McHenry (Md.), formerly a national park, and Custer battlefield (Mont.), formerly a national cemetery, were reclassified as national monuments, and Abraham Lincoln (Ky.), formerly a national park, and Chalmette (La.), previously classified as Chalmette Monument and Grounds, became national historical parks.

In addition to the National Park system, the National Park service continued to be responsible for the administration of certain recreational demonstration areas developed with emergency funds more than a decade before. These areas were formed out of misused or overused agricultural and woodlands to demonstrate to communities their value if used for recreation. At one time there were 46 such areas. Acceptance by the state of Oklahoma of the 2,228-acre Lake Murray Recreational Demonstration area, early in 1943, marked the beginning of the process of transferring these areas from federal to other jurisdiction as authorized by the act of congress of June 6, 1942. Nine remained at the close of 1946, and these were eventually to be turned over to the states, or added to existing units of the National Park system.

During the decade, the National Park service also was given the administration of three recreational areas developed as a result of the construction of dams in several western states by the bureau of reclamation of the department of the interior and the corps of engineers, war department. Planning of recreational facilities on the lakes thus formed, and their administration by the National Park service, were governed by co-operative agreements between the National Park service and the bureau of reclamation and the corps of engineers. One such area—at Boulder dam in Arizona-Nevada—was in existence when the decade began. Three more were established, at Shasta

dam and Friant dam in California, and at Denison dam in Texas.

Improved co-ordination between the director's office and the various units of the National Park system was secured as a result of the regionalization of the National Park service in 1937. The regional offices were located in Richmond, Va.; Omaha, Neb.; Santa Fe, N.M.; and San Francisco, Calif.

Substantial funds came from U.S. emergency agencies—the Public Works administration, Civilian Conservation corps and Work Projects administration—for the installation of many needed developments, such as construction of minor roads and trails, water and sewage systems and cabins and other structures, as well as for carrying on the service's broad conservation program, notably in forestry and wildlife protection. These emergency funds also made possible extensive co-operation with state, county and municipal governments in the development of parks and other recreational areas under authority of the Park, Parkway and Recreational Areas Study act of June 23, 1936. They were used also in conducting nation-wide surveys of historic U.S. buildings and sites, in construction of parkways and in acquiring lands along the historic Chesapeake and Ohio canal and restoring a section of it between Georgetown, D.C., and Seneca, Md.

In 1941, National Park Concessions, Inc., a nonprofit distributing corporation, was formed to operate accommodations for visitors in Mammoth Cave National park, Ky. This corporation later took over operation of such facilities in Isle Royale and Olympic National parks and on the Blue Ridge parkway, and began similar operations in Big Bend National park. Another nonprofit distributing organization known as Government Services, Inc., which for more than a quarter of a century had operated cafeterias, newsstands and other services in government buildings in Washington, D.C., took over operation of the Log Cabin Tea house in George Washington Birthplace National monument, Va., in 1946. These operations pointed toward ultimate government ownership of all concession buildings and facilities, though not necessarily government operation. Hitherto, it had been necessary to enlist private capital to provide such facilities, as congress had been unwilling to appropriate funds for this purpose. The system dates back to the organic act of March 1, 1872, establishing Yellowstone National park, which contained a provision authorizing the secretary of the interior in his discretion to "grant leases for building purposes . . . of small parcels of ground" for the erection of buildings for the accommodation of visitors. During World War II one park concessioner offered its facilities for sale for \$2,000,000, but federal funds for the outright purchase of the operation could not be obtained and the nonprofit distributing organizations mentioned above were not able to finance the necessary loan. However, negotiations were again under way, at the end of 1946, to secure such a loan. The objective of government ownership of all buildings and plants arose from recognized disadvantages of large investments of private capital on federal lands. As it was attained, contracts for operation of facilities would be made with experienced private concerns, or with nonprofit distributing corporations.

Increased interest was displayed by foreign governments in the National Park system, and some indicated a desire to develop national parks in their own lands patterned after those of the United States. Much of this interest, no doubt, stemmed from the visits to U.S. parks and monuments by delegates who attended the United Nations conference in San Francisco, Calif. One session of that con-

ference was held in the heart of the Cathedral Grove of redwoods in Muir Woods National monument, near San Francisco.

In 1946, closing year of the decade, the 30th anniversary of the establishment of the National Park service as a bureau of the department of the interior was observed. As part of the celebration special exhibits were prepared and installed in park and monument museums to acquaint visitors with the history and development of the national park idea. Evening campfire programs, another feature of the National Park service's program of interpreting parks and monuments to visitors, were keyed to the 30th anniversary. The anniversary year marked the formal dedication of four units of the National Park system—home of Franklin D. Roosevelt National Historic site, Hyde Park, N.Y., on April 12, first anniversary of Pres. Roosevelt's death; Olympic National park, Wash., June 15; Isle Royale National park, Mich., Aug. 27; and Mammoth Cave National park, Ky., Sept. 18. (N. B. D.)

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National Progressive Party

See PROGRESSIVE PARTY.

National Railway Labor Panel

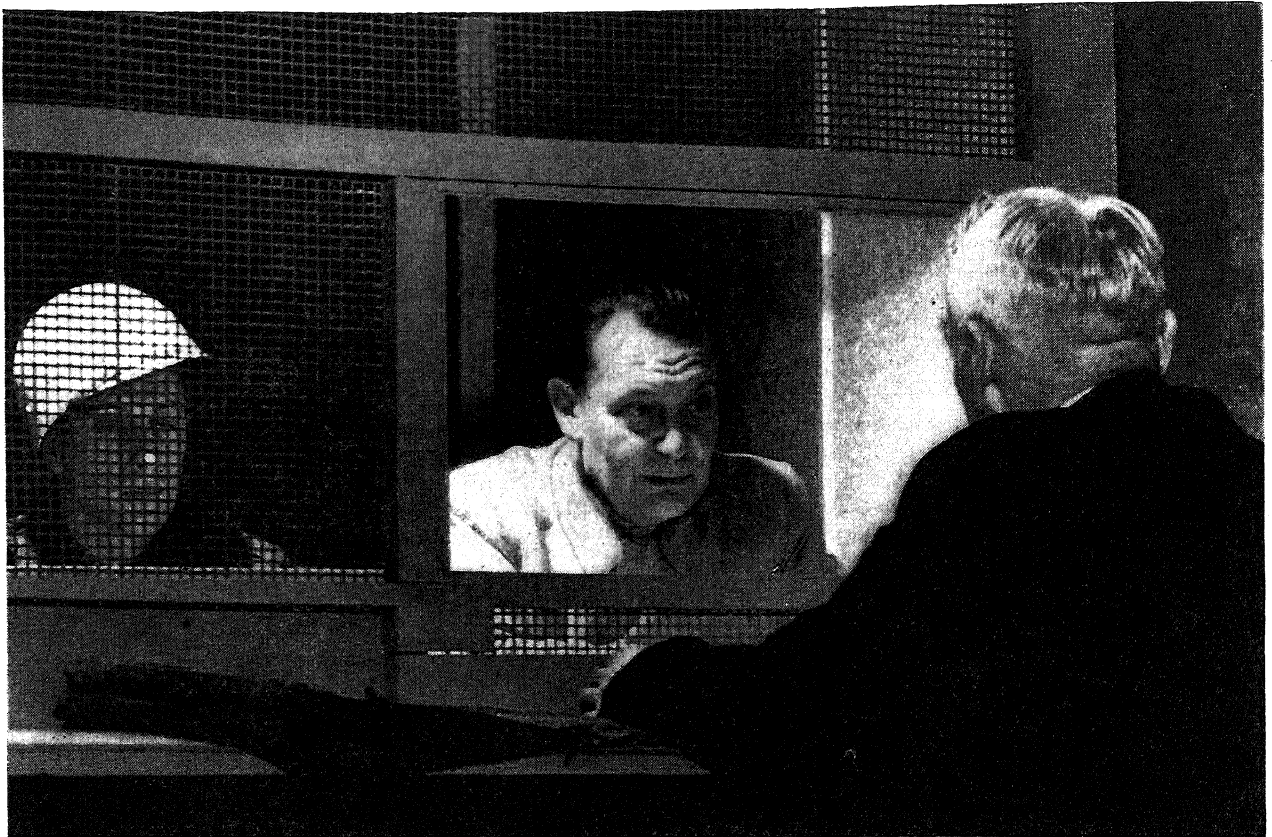
See NATIONAL MEDIATION BOARD.

National Socialism

National Socialism was started as the Nationalsozialistische Deutsche Arbeiterpartei (N.S.D.A.P.) by Adolf Hitler in Germany in 1919. Its name revealed its emphasis upon nationalism, socialism, Germanism and the working class. Like Mussolini's fascism, it combined an appeal to nationalism and chauvinist expansionism with a revolutionary call to the masses.

Many traits were from the beginning common to fascism and national socialism, which may be regarded as the German form of fascism. Both proclaimed themselves the implacable enemies of liberalism and of individual rights; both stressed the subordination of the individual to the state, the inequality of men and races, the right of the strong to rule the weak, and the necessity of the principle of blind and unswerving obedience to leaders appointed from above. Both praised the military virtues, despised and rejected compromise, humanitarianism and charity, glorified hatred and conquest, and aimed at the transformation of the whole nation into an armed camp and an instrument of perpetual readiness for warfare.

But national socialism had its peculiarly German roots. They can be traced to the Prussian tradition as it developed under the inspiration of great soldier kings like Frederick William I and Frederick II and men of blood and iron like Bismarck. This tradition always regarded the militant spirit and the discipline of the Prussian army as the model for all individual and civic life. To it was added the tradition of political romanticism with its sharp hostility to rationalism, to the principles underlying the French Revolution, to the "superficiality" of the west, and with its emphasis on instinct, on the past, even on the remote past, and its proclamation of the rights of the exceptional over all universal law and rules. Thus the exceptional became a law unto himself. These two tradi-



Hermann Goering, under surveillance by a U.S. military guard, consulting his attorney Otto Stahmer during the United Nations war crimes trials at Nuernberg in 1946. Goering committed suicide on Oct. 16, a few hours before his scheduled execution

tions were later enforced by the 19th-century adoration of science and of the laws of nature which with their iron logic seemed to work out beyond all concepts of good and evil, and by a biological theory of life which led to the acceptance of racialism.

The peace treaty of Versailles gave to Hitler a starting point, but the violent opposition which he evoked was not directed in reality against the peace treaty but against the fact that Germany had been defeated and that its plans had been frustrated. From the beginning Hitler's propaganda appealed to the military circles, who regarded the peace only as a temporary setback in Germany's expansionist program. Hitler added to the pan-Germanic aspirations for world hegemony the almost mystical fanaticism of a faith in the mission of the German race and the fervour of a social revolutionary gospel. In the years of political and economic depression which followed Germany's defeat, Hitler's appeal to the German masses as the bearers of the most exalted racial ideals in the world was eagerly accepted to counteract their inferiority complex.

Though Hitler accepted many elements of the technique of the bolshevik revolution, he found a powerful ally in the widespread fear of bolshevism which he exploited, first in Germany and then on a world-wide scale, posing as the bulwark against bolshevism. On the other hand, he gained the adherence of the masses by promises of an anti-capitalistic order. The banner of the N.S.D.A.P. was the red flag of the revolution, but altered to the German imperial colours by the addition of a white circle and a black swastika in the centre. Thus Hitler combined the appeal of social revolution and that of a militant and mystical nationalism; the extraordinary flexibility of his

dynamic doctrine enabled him to stress different elements at different times and to adapt his attitude momentarily to changing circumstances, even with complete disregard for previous statements.

Hitler understood that, especially with as wide and far-reaching a goal as world domination, it was of the utmost importance to be able to present under one common denominator all potential adversaries who might themselves change according to the circumstances. "The art of truly great popular leaders in all ages has consisted chiefly in not distracting the attention of the people, but concentrating always on a single adversary. The more unified the object of the people's will to fight, the greater will be the magnetic attraction of the movement and the more tremendous its impact. It is part of a great leader's genius to make even widely separated adversaries appear as if they belonged to but one category, because among weakly and indecisive characters the recognition of various enemies all too easily marks the beginning of doubt of one's own rightness." (From Hitler's *Mein Kampf*, Houghton Mifflin.) It was a stroke of genius on the part of Hitler to find this common denominator in the Jews and in Judaism. This enabled him to discover the Jew behind all his changing adversaries, sometimes behind communism or Moscow, at other times behind Great Britain and the United States—in short, behind everybody and everything which at a given moment seemed to oppose his wishes or to arouse his wrath.

Working from these principles, Adolf Hitler was able to carry his party from its small beginnings in a beer cellar in Munich to a dominant position in world politics within 20 years. Among his more important collaborators were Alfred Rosenberg, the author of *Der Mythos des 20. Jahrhunderts*, the most widely read book of the national socialist movement besides Hitler's own *Mein Kampf*, and of *Blut und Ehre*; Rudolf Hess, who helped Hitler

write *Mein Kampf* during their internment in the fortress in Landsberg am Lech in 1924; Georg Strasser, probably the most important of Hitler's collaborators, who separated from him in protest against the leader's opportunist policies and was killed in the blood purge of June 1934; his brother Otto Strasser, who in 1930 founded the Black Front as a more radical wing opposed to Hitler; Gottfried Feder, who drew up the first program of national socialism and was for several years its economic "expert" before receding into oblivion; Capt. Ernst Roehm, the founder and organizer of the S.A. or *Sturm Abteilungen*, the national socialist militia, who was purged in June 1934; Julius Streicher, who became famous through his anti-Semitic weekly, *Der Stürmer*; Heinrich Himmler, the organizer and commander of the S.S. or *Schutz Staffel*, Hitler's personal elite guard, and of the gestapo (*Geheime Staats-Polizei*), the secret police; Josef Goebbels, the master of national socialist propaganda; Hermann Goering, the organizer of the German air force and controller of the German industrial mobilization; R. Walther Darré, the author of *Neuadel aus Blut und Boden* and organizer of the national socialist peasant policy; and finally Dr. Robert Ley, the leader of the German Worker's front.

It took 14 years for the N.S.D.A.P. to come into power in Germany. An intrigue, started by Franz von Papen, prevailed upon the aged president of the German republic, Marshal Paul von Hindenburg, to name Hitler chancellor on Jan. 30, 1933. The death of Hindenburg on Aug. 2, 1934, removed the last conservative obstacle. Hitler became *reichsfuehrer* and chancellor, the presidency was abolished, and all troops and officials were immediately forced to take the oath of fidelity to Hitler personally. The third reich was now to create the new order which, according to Hitler, was to last for 1,000 years.

But it was to be a new order of totalitarian dictatorship, sometimes called a "new" or "true democracy," not for Germany alone. Its dynamism was bound to expand and spread. By its own nature it could not recognize any limits of its own volition, only limits set by opposed superior force. The first years were spent in absolute concentration upon forging that instrument which would enable national socialism to establish its military and industrial superiority and thus to fulfill its ambitions. "Capitalistic" unemployment was abolished by a gigantic armament program. With mounting success, the aims grew in quick progression. The first aim was to unite all Germans within the reich on the basis of self-determination, which was proclaimed as the right of the German, but denied to other peoples. The next step foresaw the creation of a *Grosswirtschaftsraum*, or a *Lebensraum*, in which the German master race or *Herrenvolk* would rule over a hierarchy of subordinate peoples. The success of that plan widened it into the vision of a hemispheric order which would embrace all of Europe, western Asia and Africa, and finally of a world order which would establish the principles of national socialism, with its emphasis upon the Germans as the leading race, all over the globe. The extreme neomercantilism which received the new name of *Wehrwirtschaft* was accompanied by cultural autarchy, a resolute hostility against all western thought. The rejection of the west and its standards of justice, law and reciprocity led also to the proclamation of the official maxim that "Right is whatever profits the German nation; wrong is whatever harms it," which was regarded by Reichminister Dr. Hans Frank, the head of the Academy of German Law, in an address on Dec. 4, 1939, as the "beginning of national socialist justice."

National socialist parties existed outside of the reich everywhere where there was a population of German descent which national socialist agitation succeeded in organizing for its own aims. According to national socialist doctrine, loyalty to one's race or blood took precedence over one's loyalty as a citizen. Blood, and not a spiritual decision of allegiance, the doctrine taught, is the decisive factor. Wherever national socialist propaganda penetrated among people of German descent outside Germany, it tried to fill them with the same spirit dominant in Germany, and to create the same institutions and organizations. Thus the implacable fight against democracy, against the principles of the equality of all citizens and of equal justice for all was being carried directly into democratic countries. National socialism, which started as a purely German movement, produced by conditions and traditions peculiar to Germany, assumed after 20 years of incessant and successful struggle a world-wide importance, and bid to influence and determine the course of history on a world-wide scale. Confidently it entrusted its fortunes to the test of war. It lost, under the united pressure of the democracies and of the U.S.S.R., which Hitler had brought together by his attack on both; Germany was crushed; Hitler himself and his expectations of a millennium of German mastery were buried in the ruins of the fatherland.

National socialism which had started in 1919 ended 26 years later.

(See also ANTI-SEMITISM; FASCISM; GERMANY; HITLER, ADOLF; PHILOSOPHY.)

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(H. Ko.)

National Trust, British

The National trust, in no way state administered or financed, continued to carry on its work of acquisition and preservation of all that is of historic interest or natural beauty in England, Wales and Ulster, by members' subscriptions and donations. During the years 1937-46 it acquired some of the proudest possessions of the British people.

Considerable assistance was given to the trust's work in 1937 by the introduction of the National Trust bill, which provided for the co-operation of local authorities all over the country with the trust. This was followed by what became known as the Country House scheme, designed to enable a greater number of historic houses and estates to become vested in the trust. Freeholds were established over 4.5 sq.mi and covenants given over 1.1 sq.mi. Ulster properties featured in the trust's records for the first time in that year.

In 1938 one of the most perfect specimens of the "black-and-white" style in Great Britain, Moreton Old hall, Cheshire, was presented, with a fine collection of furniture. New freeholds were established over many fresh acres of land in, among other counties, Derbyshire and Cumberland.

The National trust had become comparatively rich in the possession of several unspoiled villages. A 1939 addition was Chiddingstone, Kent, consisting chiefly of houses dating from the 16th and 17th centuries. A freehold over 1.4 sq.mi. in the Dovedale and Manifold valleys, and many

266 acres in Westmorland also came to the trust in that year. Covenants came, too, over large tracts of beautiful country in Westmorland, Cumberland and Devon.

In World War II a large number of its properties were requisitioned, and its agricultural and other lands were quickly harnessed to the war machine, both as food-producing and battle-training areas.

Some interesting comparative figures with Aug. 1914 emerged at war's outbreak in 1939: number of properties held, (1914) 63, (1939) 410. Total square mileage: (1914) 9.1, (1939) 92.

Square mileage protected by covenants (1914) 2 ac., (1939) 42.2.

In spite of the administrative difficulties engendered by World War II, new properties still came to the National trust: in 1940, 2.1 sq.mi. freehold and 6.3 covenanted sq.mi. In 1941 new acquisitions constituted a record increase and included Lord Lothian's bequest of his 7.1 sq.mi. Blickling, Norfolk, estate.

In 1942 more than 25 sq.mi. of freehold properties also came to the trust, the most noteworthy being Sir Charles Trevelyan's gift of his 20.3 sq.mi. Wallington estate, Northumberland, the largest single property thus far accepted. In 1943 came Lord Astor's gift of Cliveden, Buckinghamshire, the Hon. Mrs. Ronald Greville's Polesden Lacy, the Pilgrim trust's generous £10,000 toward the purchase of Avebury, Sir Courtauld Thomson's Dorneywood and Sir Richard Acland's Holnicote and Killerton estates in southwest England.

West Wycombe park, Buckinghamshire, came to the trust in 1944 from Sir John Dashwood, and in the same year Gunby hall, Lincolnshire and Flatford mill, Suffolk, famous for John Constable's "Haywain," were also presented.

Illustrating the voluntary nature of the trust's work, Nottinghamshire Miners' Workmen's Allocation fund, by donating £1,000 in 1945, assisted the public appeal which finally purchased Nottinghamshire's 5.9 sq.mi. Clumber park and lake.

Osterley park, near London, presented to the British nation through the trust in 1946 by the earl of Jersey, became a playground for Londoners.

Important 1946 landmarks were the handing over to the trust of Charlecote park, Stratford-on-Avon, the home of the Fairfax-Lucy family since the 12th century, and the presentation to the nation, through the trust, of Winston Churchill's house, Chartwell.

The year 1946, with the administration of its more than 900 properties again reaching normality, also saw an unusual increase in the properties of the trust. This was because of the inauguration of the National Land fund whereby the state accepted lands in lieu of death duties and the treasury was reimbursed by money from the land fund. While the National trust did not in any way gain financial state aid under this scheme, it began to be possessed for the first time of properties of historic interest and natural beauty from other than purely voluntary sources.

To celebrate its jubilee the trust launched a nationwide appeal for more members in 1946. Membership increased by between 4,000 and 5,000 and contributions amounted to £62,467. (See also DONATIONS AND BEQUESTS.)

(L. G. G. R.)

National War Fund

See WAR RELIEF, U.S.

National War Labor Board

See WAR AND DEFENSE AGENCIES.

National Wealth

See WEALTH AND INCOME, DISTRIBUTION OF.

National Youth Administration

Created by executive order of Pres. Franklin D. Roosevelt June 26, 1935, the National Youth administration was terminated July 3, 1943, by act of congress. During the eight years of existence it operated its program successively within three federal administrative structures. During the first four years it was a unit within the Works Progress administration; for a little more than three years it was a division within the Federal Security agency and for nine and one-half months it was a part of the War Manpower commission.

The major objectives of the NYA were stated early in its work and remained fundamentally unchanged throughout the life of the agency. They were:

- (1) To provide funds for part-time employment of needy school, college and graduate students so that they could continue their education.
- (2) To provide funds for part-time employment on work projects of young persons, the projects being designed primarily not only to give these young people valuable work experience but to benefit youth generally in the community.
- (3) To establish and to encourage the establishment of job training, counselling and placement of youth.

During the eight years of its operation a total of \$662,300,000 was expended, of which \$467,600,000 went for the payment of wages of out-of-school youth and \$169,500,000 went for the payment of wages of young people in high school and institutions of higher learning. This expenditure of federal funds enabled the employment of 4,800,000 young people, of whom 2,700,000 were given work experience and training on work projects producing useful goods and services, and 2,000,000 were school, college and graduate students on work in public and semipublic nonprofit institutions.

Administratively the NYA was set up with a national office and a state office for each of the 48 states and the territories. Below the state levels there were offices in all of the larger cities and of groups of counties, based upon population. Citizen committees were established at the national, state and local levels. At the time of the Pearl Harbor attack there were 2,500 citizen committees functioning in the NYA. It was the function of these citizen committees to assist in the selection of projects for the employment of youth, to assist in securing local resources to match those available from the federal government and to develop suggestions for the development and servicing of youth in the local community, at the state level and at the national level.

The out-of-school work projects were divided into two large groups: (1) work projects where the youth lived at home; and (2) resident projects where the youth lived in dormitories and did work in shops and upon farms, etc., at the residence or nearby.

Five hundred odd resident projects operated by NYA provided youth with a basic work experience in group living and democratic self-government. The youth built the resident centres, shops, made the furniture, salvaged the heating and cooking equipment, made their own clothing, cooked their own food, washed their clothing and raised most of what they ate.

The nonresidential work projects were the largest of the programs of the NYA. They built 3,700 schools and

reconstructed or improved 25,600 others. They also built hospitals, recreational and community service buildings, housing projects, roads, bridges and armouries; they made clothing, shoes, radio receiving sets, interoffice communication sets and all forms of light arms and munitions.

The school work was carried on in 29,000 high schools and 1,600 colleges and universities. The NYA workers made up just short of 10% of the college enrolment and approximately 3% of the high school student enrolment. The work which the students performed included: construction, repair of building apparatus and equipment, machinery and automotive work; landscaping, reforestation and soil work; health, sanitation, hospital clinical assistance; clerical and stenographic assistance; library assistance; home economics assistance, etc. (See also EDUCATION.) (Au. W.)

Natural Gas

See GAS, NATURAL.

Naturalization

See ALIENS.

Nauru

See MANDATES.

Naval Academy, U.S.

The decade 1937-46, during which its 100th anniversary was celebrated, marked a period of unprecedented activity at the U.S. Naval academy in Annapolis, Md. During this period 6,923 regular midshipmen were graduated. Of this number 4,303 pursued the shortened course in effect during the war years; 3,735 naval reserve midshipmen inducted in 12 groups were given intensive engineering training. Other groups of reserve officers were given short intensive indoctrination courses. To provide instruction for this expanded student body, more than 350 reserve officers, retired regular officers and civilians were brought to the academy as instructors. The summer practice cruise, abolished during the early war years, was resumed in 1944. In the summer of 1946 the first and third classes went to sea aboard the battleships "North Carolina" and "Washington" and the second class, aboard the carrier "Randolph." In addition a full-scale amphibious operation of two weeks' duration was carried out with the second class cadets of the military academy. Further co-operation with West Point was accomplished by the exchange of visits between the midshipmen and cadets, debates between the two academies, exchange professorships and conferences between the superintendents, commandants and department heads of both institutions. Many curriculum changes were made in the light of war experience.

In Nov. 1945 a department of aviation was established for the purpose of indoctrinating every midshipman in the fundamentals of naval aviation. (For statistics of enrolment, faculty, library volumes, etc., see UNIVERSITIES AND COLLEGES.) (R. S. CR.)

Navies of the World

By 1936 it was already evident that the complex structure of naval limitation embodied in the various treaties stemming from the Washington conference of a decade and a half previous had broken down; and that the last day of the year, which saw those treaties expire, would fail to see them renewed in any form whatever. It is true that as the new year of 1937 rang in, a conference was sitting in London to extend those treaties. But the Japa-

nese delegates to that conference were repeating with a parrot-like insistence the mystic phrase "common upper limit," which signified that they would accept no treaty which did not restrain the U.S. and Great Britain from building warships while they themselves were allowed to build. Their behaviour in China and Manchuria had not been such that the western powers could accept the dialectically fair Japanese proposal with any feeling of confidence that the interests of peace would be served. They did not accept. The document that resulted from the conference was accordingly signed only by the U.S., Britain and France; and it was so shot with exceptions, exemptions and escalator clauses that it became a dead letter within two months of signing.

The naval architects of the world were now free to consult strategists instead of diplomats in determining what ships to build.

All found much building to do because, with the exception of the new navy of fascist Italy, the world's fleets of the key date were largely composed of ships that were either relics of World War I or had been designed with the conditions of that war in mind. Yet amid this craving for the new it was remarkable how the three major sea powers (U.S., England, Japan) and the four of second rank (France, Italy, Germany, U.S.S.R.) clung to the old; how thoroughly the new designs reflected the rejected treaties, even where those treaties were honoured only by being broken.

Prewar Trends

Naval thought everywhere, with an exception to be noted, was still under domination of the idea of decisive action as achieved by a long line of battleships engaged against another as they had been at Jutland and back to the days of Lord Anson. The most pressing need felt by British, U.S., Italian and French navies was for the renewal and speeding up of the battle line. Yet the battleships laid down by all four nations, "King George V" class in England, "North Carolina" class in the U.S., "Littorio" in Italy, "Richelieu" in France, were treaty ships—that is, they remained within the treaty gun calibre limit of 16-in. and the treaty tonnage of 35,000. The British ships, indeed, employed a main battery 2 in. smaller in diameter, and this was a political rather than a technical specification; for at that final, failing conference the British had sought to have the smaller gun written into the treaties as the maximum permissible. In those days, despite the clouds rising round the horizon, many people in England still believed in what President Hoover called "Disarmament by example."

In other respects all the new battleships showed a moderate adhesion to the doctrine that air power had come of age, in the form of considerable numbers of small automatic weapons for close-in work and in mounting their secondary, medium-calibre guns in small turrets for high angle use, instead of in battery, as the earlier custom had been.

Most pulled their superstructures together to clear upward fields of fire for these pieces.

The French and Italian vessels added a third, heavier calibre of medium pieces, indicating they expected to be attacked by large surface torpedo craft at night or under smoke. Again, in the ships of all four countries, the increased complexity of fire control instruments brought about the suppression of the mast in favour of elaborate control towers, many levels high. All the ships were

much faster than any earlier vessels in their respective navies, in response to analysis which showed that most of the fighting in the previous conflict had been done by the rapidly moving battle cruisers. Yet this increased speed was relative. The Italian ships, built for a running and raiding war in the Mediterranean, were nearly 20% faster than the heavily armoured U.S. vessels, which were expected to cruise the immense distances of the Pacific, fight gunnery actions at the limits of the world and return as much as 3,000 mi. home in battle-damaged condition. The British ships, as is usual with British ships, spent much of their tonnage in sea-keeping qualities not reflected in figures. Only the Italian vessels, intended to work under cover of land-based air, were without ship-board planes.

Outside these generalizations lay the pairs of battleships (all the nations built their first new battleships in pairs) produced by the aggressive axis powers, Japan and Germany—"Yamato" class for the former, "Bismarck" class for the latter. Japan had denounced the naval treaties and was under no juridical compulsion to build a treaty ship; nor did it. But it is interesting to note that the "Yamatos" were the subject for lively debate in the imperial naval staff, one faction maintaining that since the treaties had expired there was no point in continuing the effort to produce small numbers of individually better warships which had been the product of the treaties. The need in the war with the U.S. which had already been determined upon would be for more numerous ships in which technical excellence received only secondary consideration. Partly this view was a product of that quasi-mystical confidence in *Bushido*, fighting spirit, which underlay so much of Japanese military thinking, but which the high command was not yet willing to accept in all its implications; so this viewpoint did not triumph.

The "Yamatos" were designed as more-than-treaty battleships, with a tonnage exceeding 50,000 and nine main guns of a calibre of 18.1-in., which would give them a superiority over the "North Carolinas" both in range and penetration. In view of the attention Japan itself was devoting to aviation, it was somewhat surprising that the possibility of U.S. air attacks on these ships was not given more attention; of major anti-aircraft weapons of 5-in. calibre "Yamato," received only 12 ("North Carolina" had 20 and "King George V" 16), while a good deal of tonnage went to provide a battery of twelve 6.1-in. for beating off the large, heavily armed U.S. destroyers.

The Japanese ship thus resembled the Italian in armament and may be described as a heavy, long-range vessel for a raiding war as the latter was a heavy, short-range vessel. This view, though something of an oversimplification of Japanese strategy, was reinforced by the fact that at the same time there were laid down six semi-battleships, the "Chichibu" class, which were raiders pure and simple. These ships, rumours of which caused an enormous amount of excitement and mystification, were developments of the "pocket battleships" built by Germany under the treaty of Versailles. They were designed for six 12-in. guns, armour proof against the artillery of any cruiser afloat, and for enormous speed.

While the Japanese were imitating Italy in one part of their major ship design and Germany in the other, the Germans were copying themselves. "Bismarck" was little more than a modernization of the final World War I design for a German capital ship, the never-completed "Ersatz Yorck." There was the same main armament, eight

15-in. guns in twin turrets fore and aft, the same secondary armament of twelve 5.9-in., the same elaborate armour protection, both internal and external. Indeed when the ship sailed the crew were informed she was quite literally unsinkable. She differed from the World War I ship only in having the modern control tower, the secondary armament in turrets instead of battery, the increased speed achieved by the use of modern boiler equipment, a powerful anti-aircraft battery both of heavy (4.1-in.) and automatic weapons and increased protection against torpedoes. "Ersatz Yorck" had been designed for more than 35,000 tons; the extra features in "Bismarck" consumed a good deal of additional weight, and under the 1935 Bilateral Treaty with England which permitted the re-establishment of the German navy as a major force, it had been agreed to accept the 35,000 ton limit. All this did not in the least worry Herr Hitler. "Bismarck" and her sisters (there were to have been five more) were expected to fight England anyway and he accurately estimated that he would have no war with the British until he gave it to them. The ships were of 43,000 tons and were much superior to their British opposite numbers.

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THE EXCEPTION to the view that naval power in the future as in the past could be reckoned in battleships was taken by Japan. There were indeed individuals and groups elsewhere who disagreed with the traditional view. In England the first lord of the admiralty was forced to submit, along with the estimates for new battleships, a statement in which he said it was quite possible that the air arm had outmoded the ancient weapon but that if Britain adopted the new without positive proof the old had been superseded, it might well have lost the world. England did provide for carriers in its new naval program, as did all the other sea powers except Italy, but only in Japan were they regarded as the major implements of sea power, and only because of the circumstance that found Japan planning war against a nation so superior in resources for building the normal type of warship. In Japan before World War II practical politics was a military function and the lines of political cleavage were with regard to military policies. Admiral Isoroku Yamamoto, advocate of naval aviation, had been powerful before the expiration of the treaties. With that event and the news that President Roosevelt had secured funds for the construction of a U.S. battleship fleet which Japan could hardly hope to match, he became almost omnipotent. His concept of the defense of an empire stretching 50° from China to the Marshalls (including the territory Japan expected to seize) was that of land-based aviation operating from island fields in such force as to prevent the incursion of an enemy fleet. The function of attack and counter-attack would be confided primarily to similar planes from carrier decks, landing on new fields among the islands as soon as they were taken during an advance.

The result was that carrier operations were assigned a high priority in both construction and training, as something in which the Japanese could obtain superiority over the U.S. before the latter became aware of it. The construction of both the "Yamatos" and "Chichibus" was delayed. Japan's adoption of a sensibly smaller type of carrier than that used among the western nations reflected military conditions less than the fact that the Japanese were willing to live aboard ship under conditions that

Navy Day, New York city, 1945, with aircraft carrier "Enterprise" in foreground



Americans would find intolerable, and the fatalistic Japanese view that after an action they would either possess a piece of land on which to set down the planes for which there was inadequate room on the decks, or the planes themselves would not return.

Two new carriers ("Soryu" and "Hiryu") had been the last items on the Japanese program under the treaty structure. Two new, larger and much better protected units ("Shokaku" and "Zuikaku") were laid down immediately and a still larger one ("Taiho") the following year. As the inevitable war approached, the hulls of two big passenger liners were taken over and converted to the carriers "Hitaka" and "Hayataka," while a pair of fast auxiliaries were converted to the carriers "Shoho" and "Ryoho."

At the same time, even in Japan, where the concept of carrier war had been pushed further than anywhere else, it was realized that there would be occasions when these ships would find themselves at a disadvantage—night, fog or heavy seas, for example. It was necessary to protect the carriers at such times from the attacks of surface vessels. The Japanese were not worried about attack by American battleships—their carriers could run too fast for any danger from such a source—but they respected the powerful heavy cruisers built by the U.S. navy as a result of the treaties, and it was against these that they provided.

* * *

THE JAPANESE were satisfied that their own heavy cruisers of the "Atago" and "Nachi" classes, built under the treaties, were superior to the U.S. types. Indeed they should have been, being nearly 2,000 tons above the treaty limits, which the U.S. had observed so scrupulously that most of their vessels in the class were 1,000 tons less than the prescribed 10,000. A method for Japan to obtain the desired ships had already been foreseen. When the London conference of 1930 extended the treaty limitations to cruisers and called a halt to the construction of heavy (8-in. gun) ships, it permitted the building of more light (6-in. gun) ships within certain tonnage limitations. Japan had 51,000 tons available for construction and announced that it would put it into six cruisers of 8,500 tons apiece, the "Mogami" class, mounting fifteen 6.1-in. guns in five turrets.

The first of these ships had already been seen afloat when the treaties expired and though she looked extraordinarily big from a distance, foreigners were not allowed aboard. Questioning the good faith of another nation on visual evidence was considered international bad manners. Actually the "Mogamis" were of nearly 15,000 tons. As soon as the treaties expired the Japanese sent the first two ships of the class to dock with some story that their stability needed looking after and replaced the fifteen 6.1-in. with the ten 8-in. guns for which the ships had in fact been designed. The second pair of units ("Kumano" and "Suzuya") were built with 8-in. guns *ab initio*, and carefully faked photographs were distributed to the press, showing them with three smaller guns to a turret instead of two large ones.

For the third pair ("Tone" and "Chikuma") two of the 8-in. guns were dropped. The novel arrangement of placing all the rest on the forecastle was adopted, the whole after portion of the ship being occupied by an immense hangar which permitted the use not only of more planes than in those used by cruisers of other nations, but also

of longer range types. The "Tones" were destined for the scouting wing of the Japanese fleet; but like their predecessors they carried no less than 16 torpedo tubes firing the remarkably large and powerful 24-in. torpedo. The Japanese believed firmly that cruisers would often be found in close action at night, where torpedoes would be of great importance.

This view was by no means shared in the U.S., where torpedo tubes had been removed even from the cruisers originally possessing them. U.S. naval doctrine held to the theory of the concentration of function, diversity in a fleet being procured by bringing together the various specialized ships that would supply the elements necessary for an operation. It was a theory that only a wealthy navy could afford, but under the Roosevelt administration, with war-clouds darkening in Europe and the East, the U.S. navy was so wealthy that it could have practically anything it wanted. As long as the treaty restrictions remained it wanted new cruisers.

It received nine of the latter, 10,000-tonners with fifteen 6-in. guns and great radius of action, the "Brooklyn" class. These units proved so successful that the next cruiser class (the "Cleveland"), laid down after the war in Europe had already begun, had only slight modifications, chiefly in the direction of increased anti-aircraft guns. They were given twelve 5-in. guns instead of the 8 possessed by the "Brooklyns," and room was made for these by suppressing one 3-gun 6-in. turret. Protection remained approximately the same, and as in most U.S. cruisers there were sacrifices of speed as compared with the ships of other nations.

At the same time four small light cruisers of a special anti-aircraft type ("Atlanta" class) were provided to lead destroyer flotillas and furnish cover for carriers. They had sixteen 5-in. guns and a number of automatic weapons, but nothing larger.

In view of this interest in anti-aircraft work, it was somewhat surprising to find that the U.S. navy's enthusiasm for carriers during the years after 1936 was very temperate. After the small carrier "Wasp," already building at the expiration of the treaties, only one more carrier ("Hornet") was begun till after France had fallen—though it is just to remark that congress was extremely reluctant to extend the American naval air arm, and even in voting for "Hornet," refused to provide her with planes. "Hornet" herself was large, commodious and fast, and there existed aboard a perfection in minor technical detail, such as arrestor gear, which few other nations could even approach. In accordance with American ideas at the time she was very lightly armed (eight 5-in. plus a few automatics), it being considered that the function of a carrier was to lie at a distance on the unengaged side of a battle line and fly her planes over.

She would seldom come under any but an aerial attack in such a case, and against this it was the duty of other ships to protect her. The idea of the carrier task force, later so important, was still only a matter of discussion among a few enthusiasts.

In Britain there was less reluctance to undertake carrier construction, one being built between the breakdown of the treaties and the beginning of the war; four more were on the ways at the latter date. All were conceived on lines completely different from those adopted in Japanese and U.S. carriers. They had approximately the same tonnage as the latter, 23,000; but on this tonnage they carried far fewer planes and twice as much anti-aircraft artillery (sixteen 4.5-in. plus more than double the American complement of automatics.) Their most individual

feature was a flight deck armoured heavily enough to withstand all but the largest bombs. By the time they were laid down the Austrian and Czech aggressions had made it probable that Britain's next enemy would be Germany or an Italo-German combination. These carriers ("Illustrious" class) were built for such a war, where they would expect to be operating in the North sea or western Mediterranean, directly under the shadow of enemy land-based air power, which meant they could expect repeated hits from air attack.

The same concept of a war against the European axis appeared in British cruiser construction. England had never been particularly happy with the 8-in. gun heavy cruiser type, and her designs in the field were far from successful. English insistence at the London conference of 1930 on writing restrictions against such ships into the treaty was, in effect, a rationalization. The admiralty had already determined that the heavy cruiser was too wasteful of the tonnage which could be used to obtain a larger number of smaller ships—necessary to protect extended British trade routes against raiders. The designs prepared for the 1933 program ("Southampton" class) were originally for quite small ships, armed with only eight 6-in. guns.

Before they were built there was news that the U.S. "Brooklyn" and the Japanese "Mogami" would have 15 such pieces. Southampton was accordingly expanded to a 12-gun 8,500-tonner with the explanation that she was a "reply" to those large ships. The statement was somewhat disingenuous. The admiralty was already looking across the North sea, where Hitler had come into power and had built a series of remarkable light cruisers in which, by the expenditure of much money and great refinement of detail, nine 6-in. guns were mounted on a ship of little more than 6,000 tons ("Königsberg" class.) There were not many of these, but it was an old axiom in a naval war that it takes four defenders to hunt down one raider and that to be an effective counter-raider the defending ship must outgun the corsair. In the first British post-treaty cruisers, "Colony" class, the twelve-gun armament was preserved, though the tonnage was still further dropped to obtain more units at the sacrifice of some cruising range and armour.

At the same time a large series of anti-aircraft cruisers similar to the U.S. "Atlantas" was laid down. Their tonnage was even less than that of the U.S. ships (5,500); they were supplied with ten 5.25-in. guns and given speed enough for flotilla work, either as leaders or in beating off destroyer attacks. Both Germans and Italians were building large, powerful destroyers, and contacts with these could be expected.

In view of this preoccupation with the lighter units of potential enemy forces it seemed surprising that England should have given so little attention to the heavy ships Hitler began to build under the Bilateral treaty of 1935, which permitted him to build up to 35% of the British forces in each class. The battleships he laid down have been mentioned. Two of the other units were carriers which never really came into the service, partly because German inexperience in constructing the type caused them to be delayed, partly because of the determined opposition of the luftwaffe authorities to all but a sub-surface navy. The characteristics of these carriers ("Graf Zeppelin" class) showed the odd confusion of German naval thinking. One would think it obvious that a carrier, as a ship for fleet operations, should be intended to strike from a distance by means of her planes. The moment she entered a gunnery action she would cease

to be able to handle planes and the primary reason for her existence would disappear. But the Germans produced a carrier in which much of the tonnage was expended to fit her for operation as an individual ship and for close gunnery action. "Graf Zeppelin" was of approximately the same class as the U.S. "Hornet" and British "Illustrious"; she had nearly the same anti-aircraft armament as the British ship (twelve 4.1-in.) and facilities for the same number of planes. But the tonnage which in "Illustrious" gave a stout armoured deck and in "Hornet" capacity for nearly twice as many planes, was expended by the Germans on a heavily armoured belt and the more-than-cruiser armament of sixteen 5.9-in. guns, enough to give her a good deal to say even to "Brooklyn" or "Mogami" in a gunnery duel and clearly to outmatch the British "Southamptons" and "Colonies."

Perhaps this could be referred to the megalomaniac cult, rampant in Nazi Germany, of having everything stronger than that possessed by neighbours. The five heavy cruisers of the "Bluecher" class seemed to exhibit the same mental background. In form they were reduced editions of "Bismarck" with the eight 8-in. guns mounted like the battleship's 15-in. Like "Bismarck" also they were cheats; the actual tonnage was upwards of 15,000 instead of the 10,000 permitted by the treaty. But this huge tonnage was largely expended in characteristics only secondary in military value for cruisers, such as elaborate torpedo protection, internal bulkheading and duplicate control stations. In actual fighting power the German ship was well below both the U.S. heavy cruisers and the Japanese and was only a little better than the British "Berwicks," produced a decade and a half before.

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JUST BEFORE the outbreak of World War II the Russians began an effort to rebuild their long-neglected navy, but the only units above a destroyer they produced were the first numbers of a large class of "heavy" cruisers, the "Kirovs," sufficiently remarkable ships which excited no imitators. Italian help was called in on the design, and the mixture of ideas produced a ship of 7,800 tons with great speed, little protection and elaborate minelaying equipment. The principal oddity was the main armament of nine 7.1-in. guns, a calibre neither heavy enough to deal with an 8-in. gun cruiser nor firing fast enough to handle a 6-in. gun ship in close action under conditions of low visibility. The Soviets wanted heavier pieces—the ships were originally designed for six 8-in.—but lack of technical experience in the gun factories and the obvious near approach of war caused them to accept whatever could be had most quickly.

They were somewhat happier with their destroyers, of which two main series were produced—the "Leningrad" class, on which French designers collaborated, and the "Stremitelnis," under Italian influence and for which a kind of pilot model ("Tashkent") was built in Italy. Both "Tashkent" and "Leningrad" were such big ships (more than 2,800 tons) as to be armourless light cruisers rather than destroyers. This was in accordance with the Russian theory of war that all matériel and personnel should be considered expendable provided adequate damage was inflicted on the enemy. When features commanded by Russian preoccupations, such as mine chutes and ice-breaker bows, had been incorporated in the French design, "Leningrad" turned out to be very wet and rather top heavy. The

"Stremitelnis," on much less tonnage, proved extremely successful, since their drawbacks of poor protection and low fuel capacity were not those that counted in the restricted waters of the Baltic, Black sea and White sea, where they were used. In later units of the "Leningrad" class one of the five 5.1-in. guns with which they were originally armed was removed, bringing them down to the same armament of the "Stremitelnis"; the boiler and funnel arrangements were altered and a hybrid Russian type was thus produced, which really combined the best features of both the others.

It was no accident that sent the soviets to Italy for designs in which fuel capacity and protection were sacrificed to speed. The *Regia Marina* had been building such ships for many years before the end of the treaties, and the expiration of those documents had for Italy only the effect of erasing the paper lines between cruisers and destroyers and permitting the construction of the 12 "Regolos." They were the only ships aside from battleships, some of the "normal" four-gun, six-torpedo tube destroyers and a few submarines, built by Italy during the period between 1936 and the war. They were extremely interesting as original craft on a tonnage of 3,300, which clearly took them out of the destroyer category while leaving them below the normal light cruiser level. They were armed with eight 5.3-in. guns and eight torpedo tubes, more than a match for any destroyer afloat but not nearly enough to take on the smallest cruiser, especially as they were unprotected. The always skilful Italian mechanical engineers endowed them with a speed well over 40 knots. They were, in fact, the ultimate development of the Italian theory of a running and raiding war in the Mediterranean under shore-based air cover—ships which could cut a convoy to pieces unless it was protected by heavy units, or dash in on it while its major escort was concerned with the larger Italian ships.

They were also in a sense replies, and intended to be crushing replies, to the over-sized French destroyers, of which 32 had been built in a line extending back to the middle 1920s. The French ships were all very similar, all mounting five 5.5-in. and six to nine torpedo tubes on tonnages which gradually grew from 2,000 to 2,800. All were very fast ("Terrible" made over 45 knots), intended for counter-raiding duty against destroyers in the Mediterranean. France was not moved to improve on the type by the construction of the "Regolos." The fact was that she could not afford to. Thanks to the rebirth of the German navy and the somewhat equivocal political attitude of Britain, her naval leaders had been forced to contemplate a war in which she would be alone or with Russia against the European axis, and to orient the French building program accordingly.

One result of this was the speed, really remarkable for French constructors, made with the two "Richelieus"; another was the laying down of the first French post-treaty cruisers, the "De Grasse" class. They had the same tonnage as the British "Colonies," but nine 6-in. guns instead of 12, the tonnage thus saved being used for a strong belt of armour which made these ships considerably superior both to Hitler's light cruisers and to the feebly-protected Italians. All the other French prewar construction showed the same duality of outlook. French strategists seemed to have been more exercised by the reappearance of the German submarine service than by almost anything else during those troubled years, and their concern was expressed in a large program of two types of destroyers. One was the "Hardi" class, a "fleet destroyer" on 1,700 tons, with six

5.1-in. guns and seven tubes (the new Italian destroyers had four 4.7s, the new Germans five 5-in.). The other type was a small destroyer for escort work, the "Fier" class of less than 1,000 tons, with four 3.9-in. and four tubes. Remembering that submarines had proved the most efficient of all antisubmarine craft in World War I, the French also laid down a large number of submarines, mostly small.

The British were actuated by somewhat the same ideas in destroyer construction. As the treaties went out of force and Hitler's Germany began building submarines again, England was continuing her "alphabetical" series of destroyers, building one nine-ship squadron a year, with only minor improvements between each group and the next follower. Now they suddenly leaped to two squadrons a year and in addition laid down a large series of "Hunt" class destroyers, much resembling the French "Fiers," with somewhat less speed and tonnage and lacking torpedo tubes. As replies to the big continental destroyers there was also produced a class of sixteen "Tribals"—destroyers in which the emphasis was on gunnery equipment rather than torpedoes. That is, they were small, armourless cruisers along Italian, French and Russian lines, but conceived in a somewhat different spirit. The "Tribals" had eight 4.7-in. guns for their main armament. The British produced a smaller ship than those abroad by cutting the torpedo tubes to four, holding that size was not desirable in ships so completely without protection that the first salvo would put them out of action in any case. The "Tribals" were a modern version of the classic British doctrine of obtaining quick, smothering fire against an enemy.

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UNITED STATES and Japanese destroyer design of the period preceding the war lay beyond the reach of these European influences. The first post-treaty U.S. destroyers were the "Sims" class of 1,570 tons, on which they carried five 5-in. guns and 12 tubes. This, superficially, was not much different from the French "Hardis," the British "J-K-Ns" (last of the prewar alphabeticals) or the German ships. The next, very large U.S. class ("Benson") was outwardly even more like the European types because the tonnage went up and the number of torpedo tubes was reduced by two, the "Sims" class having proved deficient in stability. Actually U.S. destroyers had little in common with the European designs. They were intended to accompany fleets to the limits of the Pacific and possessed a fuel capacity that would have been absurd in a European destroyer. They had more freeboard and far less top speed (33 knots was the most that could be expected from many of the "Bensons"), though if it were a question of traveling 1,500 mi., the U.S. ship would probably arrive first.

The Japanese destroyers of the period, which belonged to the "Asashio" class or developments of it, extracted considerably more in the way of military qualities from tonnages only slightly higher. Their cruising range was little inferior to those of the U.S., they were at least five knots faster all along the line, they added an extra gun (making six 5-in.) and mounted eight tubes for the 24-in. Japanese torpedo, which had nearly double the explosive force of the U.S. 21-in., besides being compartmented to a degree far beyond the U.S. ships. It was a fine achievement of design, but not even Japanese ingenuity could get such qualities for nothing; as in other ships, the item sacrificed was habitability in the western sense of the term. Much later, when some of these ships became prizes of war, American sailors were on the verge of mutiny when asked to live and work in the overcrowded, hot, ill-ventilated spaces which the Japanese treated as normal, though some-

thing less than a third of the number of American sailors was needed to handle the ships, since they were not sailing on military missions.

As with destroyers, there was a marked difference in submarine design between the Atlantic and Pacific powers. The smallest submarines built by the latter during the post-treaty period were the two 800-ton U.S. "Mackerels," an experimental type kept on training duty because it was lacking in endurance and habitability for active service. They were larger than the largest German boats, the 740-ton "ocean going" "Type IX," and almost as large as the largest "patrol" submarines built by England, the "T" class. The small size of the German submarines was partly due to a conscious effort in that direction through refinement of detail, since the Germans believed that small size and handiness were of great value in enabling a U-boat to escape her pursuers. Partly it was once more a question of living quarters, on which the Germans skimmed almost as much as the Japanese.

But the true determining factor was range, the distances to be covered in the Pacific.

French submarines were notable as being the only ones that retained deck tubes, on the theory that a submarine should be used at night on the surface. The submarines of all nations contained far less automatic machinery, far fewer devices than the submarines of World War I. Every naval nation had discovered independently that in submarine war personnel failures were far less numerous than mechanical failures, and it was safer to leave the flotation of a submarine torpedoboat in the hands of a man watching a dial than under the control of a machine.

Minor navies of the period produced nothing of special interest with the exception of a series of large Dutch destroyers for East Indian service, each carrying an aeroplane. This type of ship generally had grown into a small unprotected cruiser.

These, then, were the ships built from 1936 to the outbreak of the war and the ideas that lay behind their construction. Except in Japan, naval thinkers were under the domination of the idea that battle was the function of a line of battleships. Except in Germany, designers held that raiding was the function of light, fast surface craft. The whole concept of amphibious war lay in the future. Though a few officers had discussed the idea that the modern capital ship had become so large, so agile and so able to turn her guns in any direction that the line of battle was a thing of the past, there was no evidence that the idea of the overmastering importance of the aeroplane had ascended from the level of an argumentative point to that of a serious conception. The plane was considered a distinct menace, but the belief was that its influence would be to drive ships even farther from the coast than mines, submarines and improved coastal artillery had done in World War I.

The early months of World War II tended to confirm the last conclusion, though on lines completely different from those which had caused it to be drawn.

Effect of Naval Actions, World War II

In the Norwegian Campaign and the retreat from Dunkirk the British destroyer service was nearly broken up, with 87 ships heavily damaged or destroyed. The effect of these losses on naval construction was hardly less important than in the fields of politics and strategy. The ships had gone down chiefly under the attacks of German shore-based dive-bombers, and it became clear that the defense of light ships against this form of attack was wholly inadequate, both qualitatively and quantitatively. There were

several cases in which planes feinted attack till the ships had used up all their ammunition before sinking the now-helpless craft. There were many instances in which the attackers passed rapidly through the high-altitude zone where the destroyer's main battery was effective and discharged their bombs from a range which the ship's machine-guns were incapable of reaching. On the other hand, there proved to be comparatively little need for destroyers in their function as torpedo carriers accompanying a battle line.

The months following Dunkirk (June 1940) were for the royal navy a period of frantic search for better automatic weapons, finally discovered in the Swedish Bofors 40 mm. and the Swiss Oerlikon 20 mm. The early models of both guns were imperfect (the 40 mm. lacked any system of fire control) but the need for anti-aircraft defense was so acute that major alterations were made in the remaining destroyers of the alphabet class to permit their installation. The majority of the ships had been designed for four guns and eight tubes. When they left the builder's hands after refit they had only two guns in the main battery, and one bank of four tubes had been removed. In place of one of the forward guns a fire control station, equipped with radar, loomed; down either beam appeared three 40 mm., with 20 mm. scattered about the superstructure. The remainder of the weight saving went into ammunition supply for the light pieces.

The 50 World War I destroyers received from the United States underwent similar basic alterations, and the later units of the alphabet ships—O to Z classes—though larger than their predecessors, carried but four guns in their main battery and often had one bank of torpedo tubes replaced by a single 4-in. anti-aircraft piece, while automatic weapons were grouped around the bridge and on a superstructure well aft. The "Hunts," most of which were not completed till after Dunkirk, received a 4-barrelled 40-mm. pompom mount similar to those placed on the larger ships.

But they were less frequently in action against aircraft than against submarines, since by the time they appeared the battle of Britain had been fought, and it was clear that German over-water aviation had been incompetently handled, both as to construction and tactics. The emphasis of the naval war shifted, and the shift revealed that the admiralty had made a tactical error with regard to the submarines quite as gross as the technical error with regard to the effects of air attack on light ships. In the period between wars England had greatly developed sonic and supersonic devices for locating submarines under water. It was assumed that once the trail of a U-boat was taken up the result would be reasonably certain. This by no means proved to be the case. The Germans had also studied sonics. They had dampening devices of more or less efficiency and had discovered that currents and temperature gradients often nullify the effect of the detection devices. They used these facts with the greatest skill; moreover their submarines were so much faster than World War I models that they were able to run ahead of a convoy, lie in wait along its track and attack on the surface at night, under which conditions sonics were of little value.

The effect was to create a demand for large numbers of escort vessels, and this demand became acute just as the depletion of the British flotillas at Dunkirk made it most difficult to meet. To a certain degree the need had been foreseen. In World War I, more than 700 Allied destroyers had been engaged against German submarines, which

never numbered more than 60 at sea at any one time. Even at the outbreak of World War II it was evident that the Germans would have far more submarines and the Allies far fewer destroyers. The "Hunt" class destroyers and some slightly slower vessels called "sloops" had accordingly been laid down in numbers when the war broke out.

The alarming losses among convoy ships in 1942 made it clear that it would take too long to build adequate escorts in these classes, and the admiralty undertook the construction of large numbers of the most important British ship type of the war—the corvette. The corvette represented only minor variations from the commercial fishing trawler of large size. She was under 900 tons displacement, armed with a single 4-in. gun and a 40 mm. pompom, was cheap and rapid of construction; the speed of 15 knots, though low for a warship, was adequate for convoy duty. More than 300 were built in England, many more in Canada. Their construction was halted only when improvements in submarines and the availability of better machinery units and building yards made larger, faster escort vessels both necessary and possible. The new class, described as "frigates," could be considered either as enlarged corvettes with turbines that drove them at 21 knots, or as reduced "Hunt" class destroyers. More than 150 of them were built.

Simultaneously with these frigates (early in 1943) there began to appear on the sea-lanes another type, also denominated frigates in the royal navy, but in the U.S., the country of their origin, called "destroyer escorts." These were less built-up trawlers than they were cut-down destroyers, with the advantages of having been conceived as military ships from the beginning. There were five different types of destroyer escorts, all essentially similar. They ranged from 1,100 tons to over 1,400; mounted for the most part three torpedo tubes and three 3-in. guns, a two-barrelled 40 mm. (alternately a 1.1 mount rejected by one of the cruisers) and six 20 mm. Some of the early units had no torpedo tubes and some of the late ones two 5-in. guns

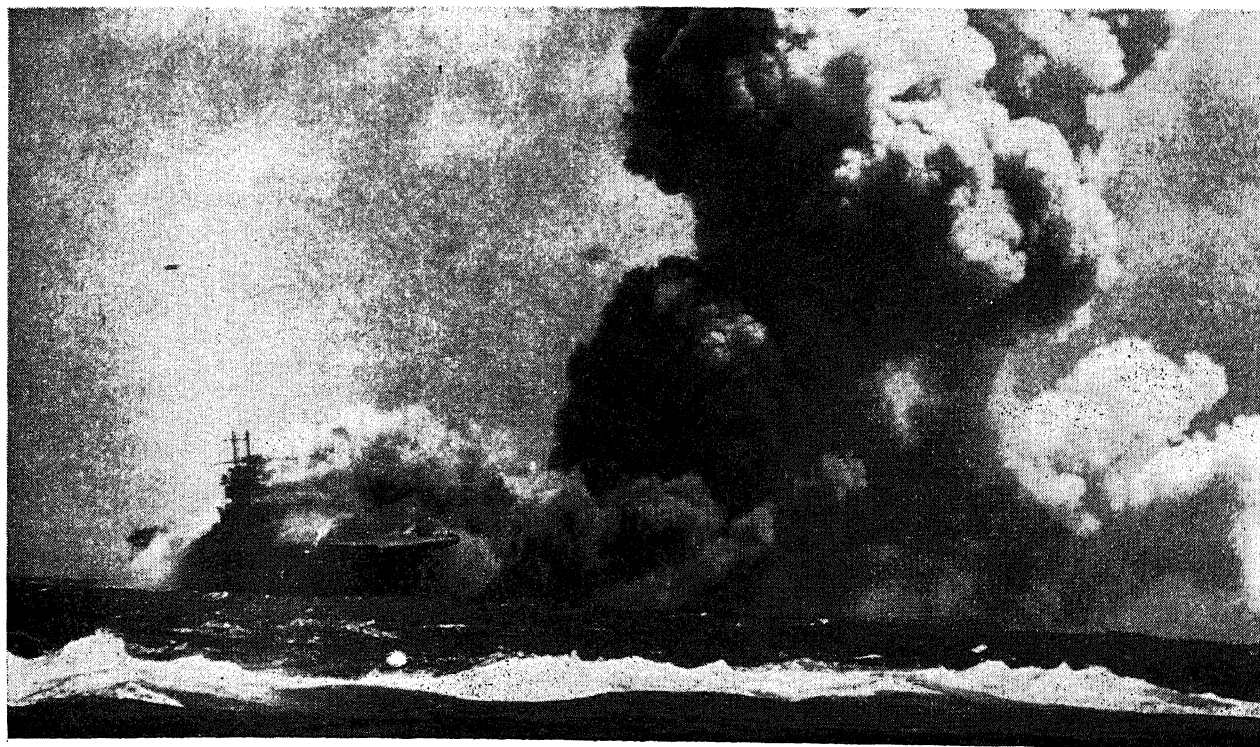
instead of three 3-in. Their speed was 21 or 26 knots, according as they were diesel- or turbine-propelled.

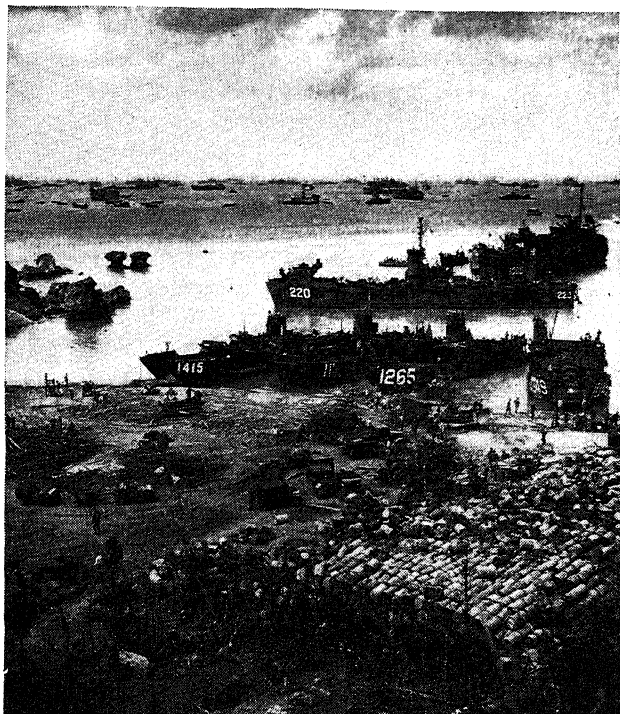
By the time they were being produced, both the hedgehog and mousetrap antisubmarine devices were in use, and all the destroyer escorts had one or the other, which they used with great effect. One of them, U.S.S. "England," actually sank six Japanese submarines in as many days. They were built from standardized parts by true mass production methods, many at places as far inland as Pittsburgh and the Great Lakes. More than 1,000 were ordered and 662 were actually built, 84 for British account, 4 for France and 6 for Brazil. The remainder of the program was cancelled toward the middle of 1944 with the effective domination over German and Japanese submarines.

It would be inaccurate, however, to describe either British or American escort vessels as those which actually broke down the submarine war. All the types thus far named were essentially defensive in function; only the turbine-propelled destroyer escorts could catch up with a large German submarine on the surface. The great success of the antisubmarine war was achieved through the co-operation of a variety of units, but chiefly those which took the counteroffensive in "hunter-killer groups." These sought out submarines and attacked them after securing a clew to their whereabouts by means of radio detection finding or aerial scouting. The United States commonly used destroyers or destroyer escorts as the surface units of such groups; the British normally employed the 30 "Black Swan" class sloops of 1,400 tons, which had better sea-keeping qualities and more powerful armament (six 4-in. guns) than the frigates.

The determining element of these hunter-killer groups was not furnished by any such vessels but by the aeroplane, and specifically by the aeroplane as flown from a class of ships unknown when the war began—the escort carriers. The first ("Long Island") had been a large diesel-engined passenger-freight ship in the U.S. merchant marine. She was taken over by the U.S. navy in March 1941 when a

The "Wasp," third U.S. aircraft carrier lost during World War II, was sunk by Japanese torpedoes on Sept. 15, 1942, off the Solomon Islands





U.S. navy landing craft, supported by battleships, cruisers and destroyers, beaching supplies on western Okinawa in April 1945

United States involvement in the war had become a probability. The importance of the aeroplane had been revealed by this time, and it was evident that even with the utmost speed of construction, no new regular carriers would be completed for as much as two years.

A flight deck was built above her hull, from which the upper works were cut away, and a few automatic weapons were installed.

In spite of her low speed it proved possible to operate planes from her deck, and 14 similar ships were immediately undertaken for England under the lend-lease arrangement, partly conversions from existing hulls, partly new hulls built to standard maritime commission design. Several were already in service before the Pearl Harbor attack. They proved an instant success, furnishing air cover for convoys through those regions of the Atlantic where it was impossible to give such cover from shore. They rendered practically impossible the favourite submarine tactic of assembling ahead of a convoy by forcing the U-boats to remain submerged during the daytime and, as radar was installed on the planes, were even able to counterattack submarines after dark.

The escort carrier program was stepped up throughout 1943 and 1944, with several firms mass-producing hulls and machinery. A whole line of additional escort carriers was converted from large fast tankers, whose fuel capacity made them especially useful. By spring of 1943 their effect on the submarines was so serious that the Germans recalled all those at sea, rearmed them with a number of automatic weapons, and ordered them to remain on the surface and fight matters out when attacked by planes instead of submerging as they had done earlier. In all, 124 U.S. escort carriers were built, 38 for England in addition to 4 the latter nation built for itself.

Later in the war escort carriers were employed both to take planes forward across the reaches of the Pacific to the fast carriers operating at its western rim and to furnish air support for amphibian operations. In the latter function they were so successful that the U.S. marine corps (in

charge of such operations in the United States) made them a permanent part of its organization. Japan also built in the escort carrier category late in the war. The ships were not a success, but this appears to have been due to operational inefficiency. Britain built flight decks across the normal superstructures of 19 large oil and ore carriers without installing hangars below or changing the commercial character of these vessels.

These last improvisations would hardly class as warships, but the U.S. navy achieved an extremely successful improvisation in the true carrier class in 1942 from the hulls of nine incomplete light cruisers. They had been intended as units of the "Cleveland" class, which was expanded to number 32 after the passage of the "two-ocean navy bill" and the proclamation of a national emergency following the fall of France in 1940. In the early combats of the war, American carrier losses were severe—at one time the fleet had only a single functional carrier. Eleven large carriers had been authorized by the bill, but only three were actually under construction in 1942, and it would be well into 1943 before the first of these could join, while the escort carriers were too slow and vulnerable for high speed combat operations.

Nine of the cruiser hulls were accordingly converted to light carriers, the first of them, "Independence," arriving in the Pacific simultaneously with the first of the large carriers.

In spite of apprehensions about stability and narrow decks, they proved a success from the beginning, no ships in the Pacific war seeing more action or rendering more service. Several became special night fighter ships with the duties of protecting the large areas after dark. As the conflict ended they had acquired a definite place in the total economy of the fleet as the cruisers of the carrier category. Two more units, built not on cruiser hulls but as carriers from the keel up, were under construction for the U.S. navy in 1946 and no less than 12 for the British.

The principal units built into the large carrier class by the U.S. navy during the conflict were the 24 vessels of the "Essex" type. They were developments of "Hornet" on 4,000 more tons, the extra displacement going into radar equipment and greatly increased batteries of light anti-aircraft weapons, 40 and 20 mm. Thirty-two of the former were provided in the original design. Under attacks from shore-based planes and especially the suicidal Kamikazes in the latter days of the war, this proved insufficient and eight more 40s were added, mounted on sponsons below the island on the starboard side.

These were the ships which, more than any others, carried the war to the shores of Japan. But eight of the twelve 5-in. guns had been mounted fore and aft of the island superstructure in twin turrets and the arrangement did not prove satisfactory. When the guns were fired across the deck, even at a considerable angle of elevation, the blast effect on any aircraft there was destructive. They also proved somewhat tender under attack—"Essex," "Bunker Hill," "Ticonderoga" and "Franklin" of the class were all so badly damaged that they were brought home with difficulty, the last not even by a Kamikaze but by a pair of bomb hits. The weakness of American carrier decks was not in fact a defect while these ships were being used on the lines of their original conception, remaining at a distance from an enemy who was approached only by their aircraft. But the actions of 1944-45 had shown it was not only possible but strategically necessary to take carriers close up to inimical shores where they could overwhelm

Correction of these defects was the main design change in the "Midway" class of carriers, the first three of which were completing just as the war ended. The main battery guns, a new type 54 calibre 5-in. of high velocity, were mounted singly in sponsons beneath the edge of the flight deck, and the deck itself was heavily armoured after the British fashion, a precaution which paid dividends to that nation during the conflict, when three of the armoured British carriers were crashed by suicide planes without being put out of action. In displacement the "Midways" were of 45,000 tons, nearly twice the size of "Essex." The leap was actuated less by the desire to get more planes aboard ("Essex" could carry as many as 120 in an emergency) than by the necessity of providing a long, wide and steady flying platform for the new two-engined bombers and fighters. England undertook a similar class of large carriers ("Malta" class), but the first of these had not yet entered service by the close of 1946.

The only other nation to undertake carrier construction during the war was Japan. The immense U.S. program, which between 1942 and 1945 gave that nation alone more carriers (without counting the escort carriers) than all the rest of the world's navies combined in 1940, was no secret. During the first year of the Pacific war Japanese carrier losses were even more severe than American. Before the close of 1942, the two big seaplane tenders "Chitose" and "Chiyoda" were taken in hand for conversion to carriers. The developing naval crisis of 1943 made it evident that this measure was not nearly sufficient. Japan was so short of steel that more carrier decks could be obtained only by cutting down elsewhere. All six battle-cruisers of the "Chichibu" class, on which construction had proceeded only languidly, were accordingly converted to carriers, as was the only heavy cruiser Japan laid down during the war. The remaining battleships of the "Yamato" class (there were to have been six) were cancelled and the light cruiser building program was reduced both in individual

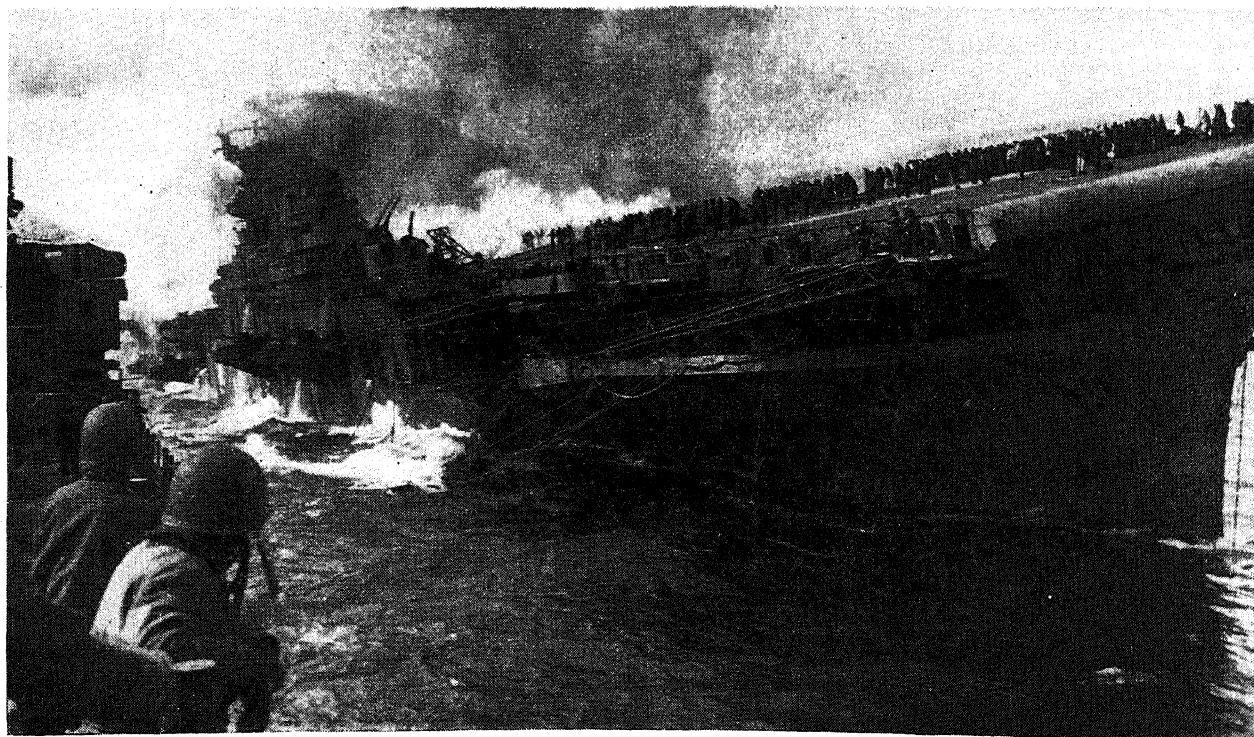
size and in total numbers. The effort was unavailing—only two of the new carriers got to sea and they were promptly sunk by U.S. submarines. The ships apparently possessed no features of special interest.

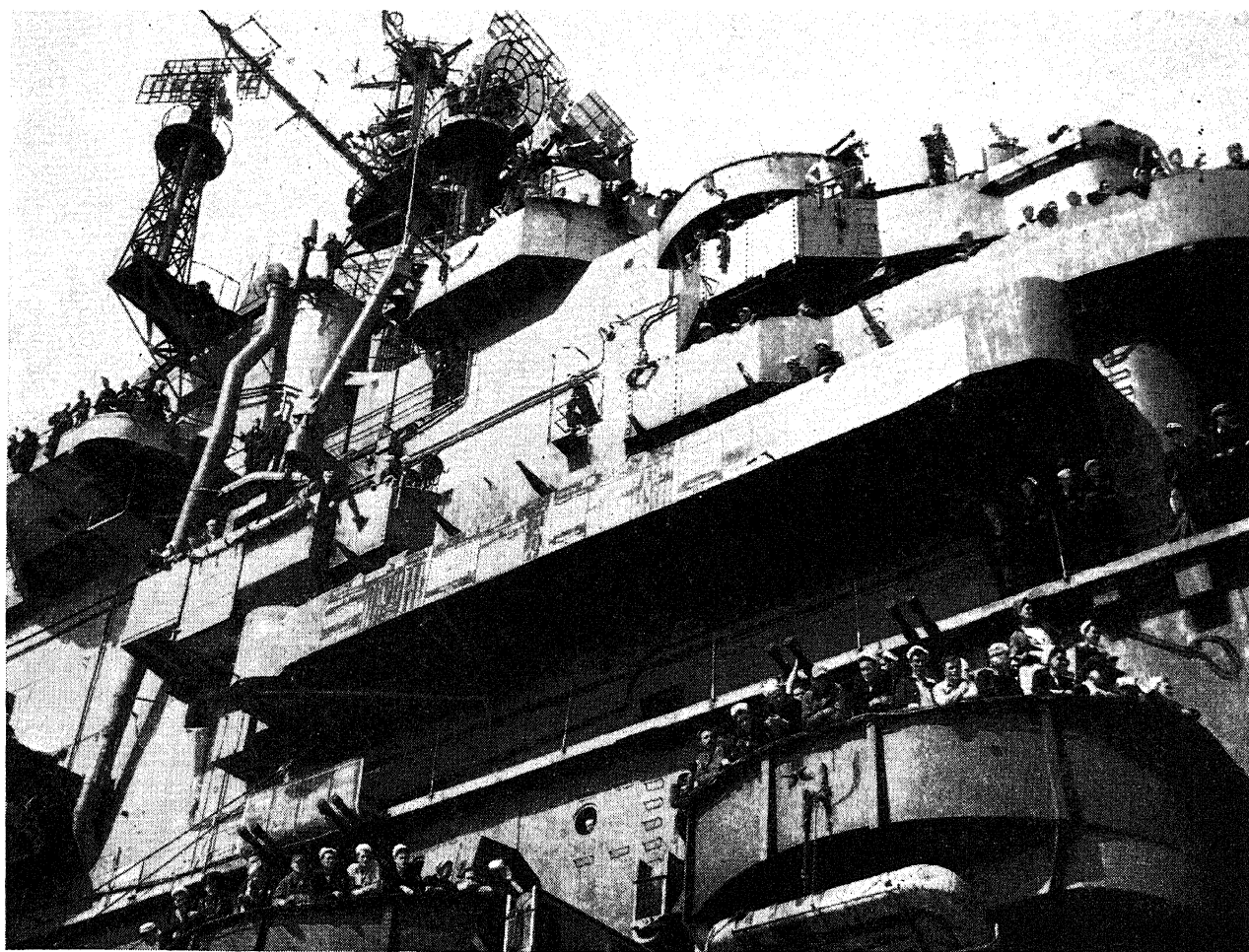
The form of oceanic warfare introduced by carriers had far more influence on characteristics of other types of ships than on those of the carriers themselves. The effect of the German dive-bombers on British light ship construction has been mentioned; but down to Dec. 1941, there was no sign that similar effects would be exercised on large ships. Only two armoured vessels had been sunk from the air in 29 months of war. One of these was a light cruiser lying in harbour, already suffering from a torpedo wound inflicted by a submarine; the other was a reconstructed Italian battleship caught at anchor without her batteries manned. The damage against similarly unready and static ships at Pearl Harbor might have been explained away. But there was a shock of the first order in the destruction of the British "Repulse" and "Prince of Wales" off Malaya in Dec. 1941 by unaided Japanese planes. Means of preventing a repetition of this result received first priority with all the naval constructors of the world.

* * *

THERE WERE numerous survivors from the "Repulse"- "Prince of Wales" tragedy, and the reasons for the loss of the two big ships, aside from the tactical fact that they lacked air cover, early became clear. The heavy anti-aircraft weapons (5.25-in.) could not be fired fast enough to eliminate dive-bombers and torpedo planes pressing home to a close-in attack, and the lighter weapons were neither numerous nor accurate enough. It was on a large scale the same defect that had brought the downfall of the destroyers off Norway. While airmen of at least the Japa-

The giant carrier U.S.S. "Franklin," aflame and listing from the hit of a Japanese dive bomber on March 19, 1945, during operations against the Japanese navy in the Inland sea. Although more than 1,000 casualties were suffered and the carrier was all but sunk, she struggled back across the ocean to the east coast of the United States under her own power





The U.S. carrier "Yorktown," veteran of Pacific naval operations, pulling into San Francisco bay in 1945. Its impressive scoreboard included 695 aircraft destroyed and 153 ships sunk

nese and U.S. navies had been carrying the development of dive-bombers and torpedo planes to a high point, the battleship men had consistently refused to consider anything but high-level bombs. The impact on the U.S. navy was more severe than it was anywhere else. The Japanese were sunk in the self-satisfied concept that they were the only people who knew how to deliver this form of attack while the British were not immediately called upon to deal with it again.

The U.S. light automatic weapon of the period was the quadruple mounted 1.1-in., a thoroughly bad piece, firing too light a shell to stop a plane until it had delivered its blow and suffering from grave mechanical defects. Experiment with the 40 mm. had continued (under the personal inspiration of President Roosevelt, it was said); it was now pushed forward apace. The upper works of the four later units of the "North Carolina" class battleships were so completely redesigned as to make them into a new type, the "South Dakota" class. In these ships everything above decks, including the control tower, was massed in a pyramidal superstructure around the single funnel, with light automatic weapons not only on all available deck space but on the steps of the structure as well—twenty-four 40 mm., thirty-two 20 mm. in the original version, a figure later increased by mounting still more such guns atop the turrets. The result was that in the Battle of Santa Cruz in Oct. 1942 "South Dakota" not only preserved herself from injury in a fierce air attack, but also shot down 32 of the 33 bombers attempting to attack the carrier she was pro-

tecting. The older U.S. battleships were radically altered to accommodate similar equipment, and through the remainder of the war no ship was sunk from the air while guarded by a battleship.

In the four battleships of the "Iowa" class, built during the war, the tonnage had been sent up to 45,000 to obtain greater speed and better protection with the same main battery. More deck space permitted anti-aircraft armament to be carried even further than in the "South Dakota." They were given no less than 124 light weapons. It is possible that the six British battleships of the "Lion" and "Vanguard" classes laid down at the beginning of the war might have turned out somewhat similarly, but Britain's need for light craft to combat submarines was always so pressing that both steel and builders' time were wanting for the completion of these ships. Moreover, there seems to have been considerable mind-changing and argument about the armament of these vessels, which also had the effect of slowing construction. The "Lions" were originally designed for nine 16-in. guns and the "Vanguard" class, at least for some time, to carry twelve 14-in. When "Vanguard" herself, the only one completed, appeared she mounted eight 15-in. All the others were in a state of suspended animation.

Japanese cruiser construction during the war was limited by the fact already mentioned to the four ships of the "Agano" class, mounting six 6.1-in. guns on 6,000 tons, and employed chiefly as stiffening for torpedo flotillas. In fact, as the war drew nearer the shores of Japan in 1943 and 1944, the torpedo became more and more the major weapon of that power. Several of the old but still quite fast "Kuma" class light cruisers were altered to mount no

less than 28 tubes, 24 of them firing the new large torpedo, the ships being bulged out along the strakes to carry them. Two series of heavy destroyers were produced, the larger of them ("Terutsuki" class) quite big enough to stand comparison with similar Italian ships as unprotected light cruisers. On a tonnage above 2,500, these ships mounted eight 4-in. guns and carried four torpedo tubes of the large size. The remaining displacement went into the engine room and resulted in a speed of well over 40 knots, which the Japanese vessels could maintain for a considerable period of time while the Italians could not. The other line of destroyers, the much more numerous "Takanamis," were slightly smaller and more nearly normal in design, mounting six 4.7-in. guns and eight large tubes, with a speed well in excess of that developed by U.S. ships of the class. Late in the war another new type of Japanese destroyers, the "Matsus," began to appear. They were throwbacks as to military characteristics and size, having only four guns with varying numbers of tubes, and were much simplified ships designed for quick construction to replace the heavy destroyer losses Japan had suffered.

Fuel capacity and the increasing amount of radar and fire control gear left most war-built U.S. destroyers sensibly lower in top speed (though still not in cruising speed) than their contemporaries built elsewhere. After Pearl Harbor, the 5-gun, ten-tube "Bensons" began to undergo some of the alterations which had appeared earlier in British craft. Two main types of revision were made; in one, one of the 5-in. guns was removed in favour of automatics; in the other, a bank of five torpedo tubes was lost. Additional new equipment eventually brought most of the class to the sacrifice both of a gun and a bank of tubes and left the

"Bensons" inferior in fighting power to the Japanese ships they might encounter in the Pacific.

The possibility had been realized before the event occurred, and a new design was prepared; most of the destroyer building yards continued to turn out "Bensons" until prefabricated parts for the new series became avail-

Table I.—British Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	12	12	11	12	11	13	13	12	13	13
Battle-cruisers	3	3	3	3	1	1	1	1	1	1
Carriers	0	0	0	0	1	6	9	12	15	16
Escort carriers	0	0	0	1	2	14	34	38	38	?
Heavy cruisers	18	18	17*	17	15	15	12	12	12	10
Light cruisers	44	47	50	60	58	61	60	59	63	†
Flotilla leaders	0	0	0	0	0	0	0	0	0	0
Destroyers and torpedo boats	161	176	192	†	†	†	†	†	†	232
Sloops and escort vessels	40	43	45	§	§	§	§	§	§	351
Submarines	54	56	62	†	†	†	†	†	169	162
Minelayers	1	1	1	1	4	6	4	4	4	4

*One converted to a light cruiser.

†Several scrapped; no accurate data.

‡British destroyer strength varied violently during the war as the result of sinkings, construction and the acquisition of 50 destroyers from the U.S.

§The number of escort vessels showed wide variation.

||Submarines showed a similar variation.

Table II.—U.S. Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	15	15	15	15	16	20	22	24	24	22
Battle-cruisers	0	0	0	0	0	0	0	0	0	0
Carriers	4	5	5	6	7	4	19	25	29	31
Escort carriers	0	0	0	0	1	12	35	66	73	*
Heavy cruisers	17	17	17	18	18	13	15	16	23	23
Light cruisers	12	15	19	19	19	23	30	41	45	49
Flotilla leaders	0	0	0	0	0	0	0	0	0	0
Destroyers and torpedo boats	196	213	225	191	200	269	381	448	489	†
Sloops and escort vessels	7	7	7	7	6	16	368	457	500	*
Submarines	84	90	96	105	114	142	172	239	274	†
Minelayers	8	8	8	9	9	9	9	21	21	21

*Some scrapped, but others returned by Britain under lend-lease.

†Numbers scrapped or sold.

Table III.—French Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	6	6	7	8	8	8	5	4	4	4
Battle-cruisers	0	0	0	0	0	0	0	0	0	0
Carriers	1	1	1	1	1	1	1	1	1	2
Escort carriers	0	0	0	0	0	0	0	0	0	0
Heavy cruisers	7	7	7	7	7	7	3	3	3	3
Light cruisers	12	12	12	12	12	11	7	7	7	8
Flotilla leaders	31	32	32	28	27	26	7	7	7	7
Destroyers and torpedo boats	37	38	38	30	38	31	15	15	15	21
Sloops and escort ships	0	0	0	0	0	0	0	0	0	0
Submarines	68	73	75	63	62	51	28	29	29	29
Minelayers	1	1	1	1	1	1	1	1	1	1

Table IV.—German Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	2	2	3	3	3	3	3	2	0	0
Battle cruisers	0	2	2	2	2	2	2	1	0	0
Carriers	0	0	0	0	1	1	1	1	0	0
Escort carriers	0	0	0	0	0	0	0	0	0	0
Heavy cruisers*	3	3	4	5	4	4	4	3	0	0
Light cruisers	6	6	6	4	4	4	4	4	0	0
Flotilla leaders	0	0	0	0	0	0	0	0	0	0
Destroyers and torpedo boats	26	38	41	?	?	?	?	26	0	0
Sloops and escort vessels	10	10	10	?	?	?	?	?	0	0
Submarines	28	43	72	?	?	?	?	?	0	0
Minelayers	0	0	0	0	0	0	0	0	0	†

*Including three pocket battleships.

†No accurate figures available. 741 submarines sunk by the Allies during the war; about 200 surrendered; numbers damaged on the stocks or in harbour by bombing and some destroyed. No completion dates at present obtainable.

Table V.—Italian Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	4	4	6	6	6	8	6	*	*	2
Seaplane tenders	1	1	1	1	1	1	1	*	*	0
Heavy cruisers	7	7	7	7	4	3	2	1	*	0
Light cruisers	15	14	14	13	12	10	8	*	*	0
Destroyers and torpedo boats	103	120	124	114	101	94	74	71†	*	12
Sloops and escort vessels	2	2	2	10	12	12	12	*	*	12
Submarines	86	106	†	†	†	†	†	†	*	0

*Remaining ships under internment, with disposition to be decided in peace treaties.

†Many destroyers remaining in German-held Italy scuttled in 1945. Salvage uncertain.

‡29 Italian submarines completed during the war; 89 were lost, but dates of completion are uncertain.

Table VI.—Japanese Naval Strength, 1937–46

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Battleships	9	9	9	10	11	10	9	5	0	0
Seaplane tenders	2	4	5	5	5	1	0	0	0	0
Carriers	5	6	6	8	9	6	7	4	0	0
Escort carriers	0	0	0	0	0	3	4	1	0	0
Heavy cruisers	14	17	18	18	18	14	14	6	0	0
Light cruisers	19	19	19	19	22	21	21	8	0	0
Flotilla leaders	0	0	0	0	0	0	0	0	0	0
Destroyers and torpedo boats	107	121	122	126	122	114	90	52	0	0
Sloops and escort ships	No accurate figures	No accurate figures	No accurate figures	No accurate figures	No accurate figures	No accurate figures	No accurate figures	No accurate figures	0	0
Submarines	58	59	65	67	67	67	83	61	0	0
Minelayers	21	13	23	21	19	no accurate figures	no accurate figures	no accurate figures	0	0

Table VII.—U.S.S.R. Naval Strength, 1937-40

	1937	1938	1939	1940*
Battleships	3	3	3	3
Heavy cruisers	1	3	3	3
Light cruisers	2	2	2	2
Destroyers and torpedo boats	30	40	45	50
Submarine†	21	150	150	130

*No accurate figures available after 1940.

†Approximate.

able. The latter were the "Fletchers," of which 175 were built. It was a 2,100-ton flush-deck design with five 5-in. guns, ten tubes, four 40 mm. and six 20s. These were the standard U.S. destroyers through most of the war. An attempt was made to improve the type in the 70 "Sumners," of which the first units appeared in 1944. They were slightly heavier than the "Fletchers" and had six 5-in. guns paired (an arrangement to which U.S. gunnery officers objected) in order to make room for twelve 40 mm. (two quad mounts and two twins) which were felt to be necessary in view of the increasing intensity of Japanese air attacks. These destroyers had the same power plant as the "Fletchers." The extra weight made them both slower and less economical of fuel, the latter to such an extent that the design was altered to produce the "Gearings," which were "Sumners" 15 ft. longer, with the extra space devoted to fuel.

Numbers of the "Bensons" had their tubes removed and were converted to fast minesweepers for work in Japanese waters toward the close of the war. A squadron of "Sumners" was altered to light minelayers. After the Japanese began to use suicide bombers another alteration was made in both destroyers and destroyer escorts. This produced the "picket boat" with all torpedo tubes removed and replaced by still more light anti-aircraft weapons and radar.

The suicide bombers brought alterations of the same type in both U.S. and British cruisers. The original numbers of the U.S. "Atlanta" class possessed sixteen 5-in. guns, 12 in double turrets on three decks fore and aft, with a wing turret on either beam. The original British "Didos" had ten 5.25-in. Later "Atlantas" lost the wing turrets, which were replaced by 40 mm. quadruple pompoms, and the later "Didos" sacrificed one of their turrets to similar pompoms. In the British service the "Swiftsure" class of cruisers, which immediately followed the "Colonies," preserved the hull form and tonnage of the earlier ships and obtained the desired anti-aircraft fire power by suppressing one main battery three-gun turret, which resulted in a nine-gun ship like those in continental navies. The U.S. solution in cruisers above the "Atlanta" size was to increase the over-all displacement rather than reduce the main armament of a standard tonnage ship.

The "Clevelands" had space and weight carrying capacity sufficient to permit them to be armed with sixteen 40 mm. and a large number of 20s with only a very slight increase of tonnage. The later numbers of the large class (there were ultimately 29) had these small pieces written into the design. In all a consistent effort was made to reduce superstructure and silhouette, the last two of the class ("Fargo" and "Wilmington") being one-funnel ships. In the succeeding "Worcester" class, under construction at the close of the war, the tonnage was sharply jumped to 14,000, an extraordinary figure for a "light" cruiser and one comparable with the 13,000 tons of the U.S. war-built heavy cruisers, the "Baltimores."

Like the ships that preceded them, these had a main battery of nine 8-in. guns, but the secondary armament had jumped to twelve 5-in., and the first ships of the class were completed late enough (1943) to receive the full impact of the air war, so they were given sixteen 40 mm. and twenty-eight 20s. There was difficulty about the turret mechanism

of the new model high-angle 8-in. guns mounted; it was nearly a year before the next numbers of the class appeared (priorities for carriers and destroyers were also responsible for the delay). At this time the light armament was still further increased and the displacement moved up another 1,000 tons. After 16 of the class had been built a still better 8-in. gun was developed, capable of rapid fire. It was made the main armament of the new 17,000-ton "Des Moines" class, only two of which were carried through to completion after the close of the war.

The most remarkable cruisers produced for the U.S. navy were the "Alaska" class of 27,000 tons, originally intended to fill the wide gap which had appeared between the capital ship of 45,000 tons and the cruiser of less than one-quarter that size, and to perform heavy duty functions more economically than could be undertaken by either of the others—such as handling the Japanese "Chichibu." The designs had been prepared in 1939 and authorization for the ships was secured in 1940, but none was actually laid down till immediately after the Pearl Harbor attack, when the general U.S. strategic situation was so poor that it seemed not unlikely the United States might be forced to conduct a raiding war. These were seen as the heavy raiders for such a war. They mounted nine 12-in. guns behind good protection and had a turn of speed sufficient to keep them away from battleships. Three of these ships were built; two of them saw service in the Pacific. There was no longer anything for them to raid by the time they were completed, but they did duty as carrier guards and for one ("Guam") it was claimed that she shot down more Japanese planes than any other ship.

Sweden built two small light cruisers with seven 6-in. guns and a host of anti-aircraft weapons. No other nation produced ships above a destroyer during the war, though it is perhaps worth remarking that Brazil, becoming a naval building nation for the first time, constructed seven ships in the destroyer class.

When the war began, the soviet union was building at least two battleships in the atmosphere of secrecy usually surrounding the naval undertakings of that nation, but both were bombed out or blown up on the stocks during the German invasion. In fact, except for some of the large destroyers operating in the White sea, Russian ships hardly justified their design during the conflict. There were supposed to be nearly 200 Russian submarines when Hitler plunged across the borders, many of them of the small "Malodky" type, designed in the one direction for rapid production at inland factories and in the other for operation by small crews in restricted waters. There was no record of any accomplishment by these craft. The Japanese did better with diminutive submarines. Their midget craft with two-man crews, carried on larger submarines, entered Pearl Harbor on the day of the attack there. After this date they became ineffective, though they might have done more had the conflict been prolonged. More than 500 had been built toward the end of the war, and the Japanese intended to use them as suicide boats in beating off the invasion.

British, Italians and Germans all imitated the tiny Japanese craft, the first two with notable success, each succeeding in torpedoing an enemy battleship in harbour by means of two-man submarines. The German-made submarines were of four different designs—the 1-man "Biber" and "Molch" types, the 2-man "Seehund" and 18-man "Walterboot." It was characteristic of German methods and strategy that all were being withheld for the assembly

of a large number of craft when the war came to an end.

There was no such delay about the employment of the large German submarines, but neither was there any particular originality of design, the various type numbers mainly reflecting minor variations of machinery and armament.

An interesting type was produced in 1942, a 1,600-ton supply submarine, carrying ten days' supplies for ten cruising submarines.

At the very end of the war the Germans brought out another new class in the "Type XXI" submarine with underwater speed high enough to permit it to escape escort vessels while submerged.

Like all German submarines from the middle of 1944 it was fitted with an air tube called the *Schnorkel*, which allowed it to operate on diesels while under water.

The "Type XXI" never received adequate combat tests.

Like the Germans, the Japanese used many of their larger submarines for supply purposes, and in support of their isolated island bases toward the close of the war. They even diverted to this purpose the two monstrous submarine aircraft carriers they produced, with a hangar deck capable of accommodating six planes. These craft were of nearly 5,000 tons, the largest submarines ever built, but they were complete failures, slow in diving, unhandy and sluggish of movement.

As with submarines, other naval craft throughout the war tended to erase the boundary line between warships and auxiliary vessels. The British grain and ore carriers with flight decks have been mentioned. Many U.S. and a few Japanese destroyers were converted into light, fast armed transports. In 1944 there were added to the list of the U.S. navy more than 300 "attack transports" and "attack cargo ships" for beachhead work. These were large sea-going ships, to be clearly distinguished from the various types of landing craft; but they mounted armaments of 5-in. and lighter guns that made them equal or superior to a destroyer in fighting power.

They were intended not only to protect themselves from aerial attack during an operation, but also to cover by their fire the movements ashore of the troops they carried until a beachhead was thoroughly established. (F. Pt.)

(See also MUNITIONS OF WAR; SUBMARINE WARFARE; WORLD WAR II.)

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Nazis

See ANTI-SEMITISM; FASCISM; GERMANY; NATIONAL SOCIALISM.

NDMB (National Defense Mediation Board)

See WAR AND DEFENSE AGENCIES.

NDRC (National Defense Research Committee)

See WAR AND DEFENSE AGENCIES.

N.E.A. (National Education Association)

See SOCIETIES AND ASSOCIATIONS.

Nebraska

One of the states formed from the Louisiana purchase, Nebraska lies in the lower Missouri valley in the west north central part of the United States; admitted to the union in 1867. Area 76,653 sq.mi.; water area 584 sq.mi. Population (1940) 1,315,834, a decrease of 62,129 from 1930; 39.1% was urban. About 1% of the population was Negro and about 8% foreign-born, principally German and Scandinavian. Capital, Lincoln (81,984). On July 1, 1944, the bureau of census estimated the population at 1,213,792.

The principal state officers for 1937-41 were: governor, R. L. Cochran; lieutenant governor, Walter H. Jurgenson (succeeded by W. E. Johnson); auditor, William H. Price (succeeded by Ray Johnson); secretary of state, Harry R. Swanson; treasurer, Walter H. Jensen (succeeded by T. W. Bass and John Havekost); attorney general, Richard C. Hunter (succeeded by W. R. Johnson); superintendent of public instruction, Charles W. Taylor.

In the election of Nov. 1940, Dwight Griswold became the new governor. In the presidential election of that year, Willkie received 352,201 votes and Franklin D. Roosevelt 263,677.

Alone among the 48 states Nebraska continued to have a one-house legislature, the 43 members chosen for two-year terms on a nonpartisan ballot.

Griswold was re-elected governor Nov. 3, 1942, for the term 1943-45.

Other state officers elected for 1943-45 were: lieutenant-governor, Roy W. Johnson; auditor, Ray C. Johnson; secretary of state, Frank Marsh; treasurer, Carl G. Swanson; chief justice, Robert G. Simmons.

On Nov. 7, 1944, Griswold was again re-elected governor, for the term 1945-47. Other state officers in 1944 were: lieutenant governor, Roy W. Johnson; auditor, Ray C. Johnson; secretary of state, Frank Marsh; treasurer, Carl G. Swanson; superintendent of public instruction, Wayne O. Reed; chief justice, Robert G. Simmons. The vote for president in 1944 was: Thomas E. Dewey, 329,880; Franklin D. Roosevelt, 233,246.

The legislature of 1945 enacted laws providing for more liberal unemployment benefits, introducing retirement systems for municipal and school employees, adjusting county salaries and setting up machinery for the comprehensive regulation of aviation. The legislative council was authorized to initiate or continue extensive investigations of electric power, irrigation and water utilization, public school organization and finance, municipal financial practices and the legal status of life insurance companies. Edward Gillette replaced Carl G. Swanson as state treasurer.

Val Peterson, Republican, was elected governor Nov. 5, 1946, for the term 1947-49. Other state officers for 1947-49 were: lieutenant governor, Robert B. Crosby; auditor, Ray C. Johnson; secretary of state, Frank Marsh; treasurer, Edward Gillette; state superintendent of public instruction, Wayne O. Reed; chief justice, Robert G. Simmons.

(L. W. L.)



Wheat destined for U.S. domestic consumption and for foreign famine relief being loaded onto cars from full elevators at Omaha, Neb., in March 1946

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Nebraska: Statistical Data

Table I.—Education (Public)

	1938	1940	1942	1943	1944
Elementary school pupils	208,635	276,188	257,664	253,856	237,589
High school pupils	81,281				
Elementary teachers	10,340	13,759	13,319	13,619	12,252
High school teachers	3,524				

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1938	1940	1942	1944	1945
Number of cases on general relief	9,610	10,226	6,882	2,619	1,964
Cost of general relief	\$133	\$117	\$101		
Recipients of old-age pensions	26,992	27,784			
Cost of old-age pensions	\$462	\$459			
Dependent children receiving aid	10,463	12,094	12,731	7,239	5,089
Blind receiving aid	608	688	737	583	442

Table III.—Communications

(Money figures in thousands of dollars)

	1937	1938	1942	1944	1945
Highway mileage		8,627	9,157	9,235	9,167
Expenditure on highways	\$10,917	\$11,589			
Railroad mileage	6,105	6,092	8,502	8,309	6,478

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1940	1942	1945
State revenue	\$30,609	\$33,810			
State expenditure	\$32,105	\$29,148			
Number of banks	432	427	421	412	409
Total bank deposits	\$312,900	\$298,500	\$323,200		
Number of natl. banks	136	136	133	133	130
Deposits of natl. banks	\$240,194	\$241,809	\$282,243		

Table V.—Agriculture
(All figures in thousands)

	1937	1940	1942	1944
Income from crops and livestock	\$243,700	\$229,819	\$459,264	\$623,286
Acreage, principal crops	18,499	17,322		15,578
Leading crops (bu.)				
Barley	10,642	22,544	38,258	8,928
Corn	82,992	106,913	242,708	329,855
Hay (tons)	1,514	1,366	1,593	1,674
Oats	35,637	35,760	58,278	35,586
Potatoes	8,165	11,340	12,876	8,400
Sugar beets (tons)	882	910	930	490
Wheat	47,184	34,821	69,908	35,944

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	19,590	18,807
Wages paid	\$22,126	\$20,624
Value of products	\$282,502	\$273,525

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939
Value of mineral production	\$4,838	\$4,029	\$4,390
Leading products (value)			
Sand and gravel	\$1,062	\$1,021	\$870
Stone	1,146	781	661
Clay	482	335	579

Necrology

See OBITUARIES.

Negroes, American

The eventful decade 1937-46, spanning the United States' greatest external crisis, produced great shocks and transformations in the life and status of the nation's greatest minority group—the more than 13,000,000 Negroes (12,865,585 in the 1940 census), numbering 9.8% of the total population.

Checked at many points by continuing discrimination, galvanized at others by the general momentum of social

change, affected most of all by its own increased inner dynamic of group struggle and progress, American Negroes in those years achieved larger net gains than in any other period of their history.

Outstanding among these gains were: (1) a considerable intersectional population shift, aggregating much more than 3,000,000, northward and westward from southern centres under the stress of rural depression and expanding war and peacetime industry; (2) a rapid urbanization at twice the general population rate, by which more than 6,500,000 Negroes became resident in urban communities, north and south; (3) maintenance of these footholds in the new centres, even during the years of the depression, largely because of the New Deal programs of public works and public relief; (4) marked improvement of educational, civic and economic conditions over the previous ones, in spite of the handicaps and increased tensions of overcrowded and restricted residence areas in many cities; (5) rapidly accelerated participation in community activity, self-help, business and professional life through voting, first in the city centres north and midwest, but after the supreme court decision outlawing closed white primaries, in all the southern states; (6) considerable advance to new industrial employment and to the semiskilled and skilled levels of such industries, indicated by a wartime peak of 1,250,000 Negroes, estimated by the War Manpower commission as 7.2% of total war industry employment, with 15% in the skilled categories; at the same time, federal employment of Negroes rose from 8.4% to 12.5% with an estimated 50% increase in upgrading; (7) inclusion of Negroes in the ranks of organized labour that brought their numbers to an estimated 1,500,000 unionized workers; (8) rapid educational progress, as indicated by the reduction of illiteracy to about 10%, increase of secondary school enrolment from 157,515 in 1937 to more than 300,000 in 1946, while the number of college students increased in the same period from 22,045 to 53,030 without counting substantial recent G.I. registration figures; (9) active participation in the cultural arts, which brought manifold recognition to a rapidly expanding number of Negro writers, artists, actors, singers, composers, scholars and research scientists (*see below*); (10) a new stature and scope for Negro leadership both in Negro and interracial organizations engaged in constructive programs of race relations and general social progress, including even southern liberal organizations like the Southern Congress for Human

Negro membership in U.S. labour unions rose to an estimated 1,500,000 during the decade 1937-46. Negro and white seamen are shown here applying for work as deck and engine hands at the National Maritime Union hiring hall in New York city



Welfare, the Society for the Abolition of the Poll Tax, the Farm Tenants' union and the like.

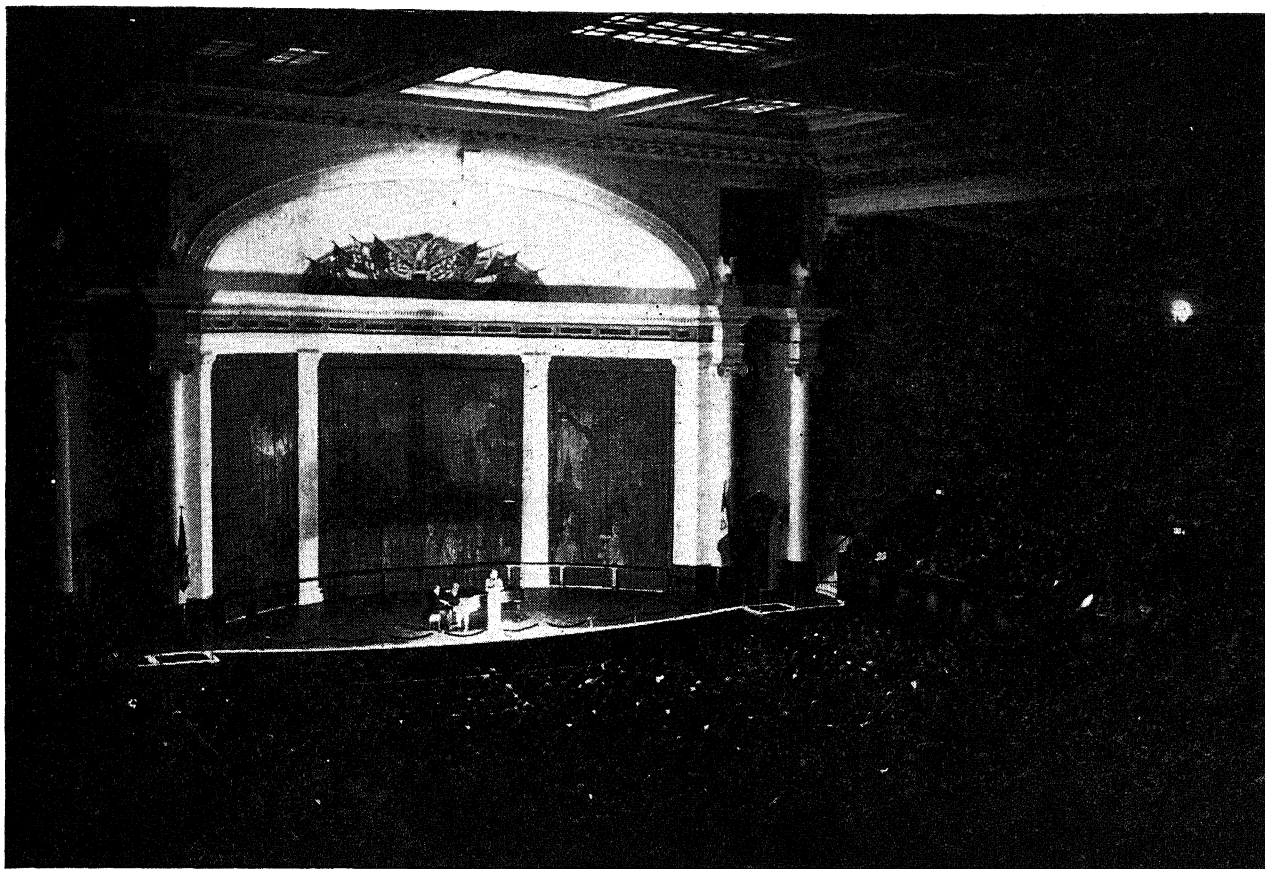
Chronology of Developments.—In 1937 wide-scale organization of Negro workers was launched by the steel workers' and the garment workers' unions, also by the automobile workers' and the mine workers' unions under the Congress of Industrial Organizations. The Southern Farm Tenants' union also held its first meeting with 150 white and Negro delegates. The Farm Tenancy commission, with two Negro members, inaugurated the government program for farm resettlement of sharecroppers and under federal auspices, model low-cost housing was extended to a number of urban Negro areas, among them Atlanta, Ga., Jacksonville, Fla., Louisville, Ky., Atlantic City, N.J., Philadelphia, Pa.

In 1938, in the case of *Lloyd L. Gaines vs. Missouri*, the U.S. supreme court ruled that unless a state provided equal educational facilities for Negroes, the regular state schools must be opened to Negroes. The decision, not immediately implemented, gave great impetus to larger educational provisions for Negro education on the part of several states. The same court also affirmed the right of Negroes to picket against racial discrimination, and New York state passed an antidiscrimination civil rights bill. The Southern Conference for Human Welfare adopted at its Birmingham, Ala., meeting a broad human rights and resources development program for the south, without discrimination. The Farm Security administration began a remedial program following the National Resources committee's report that the average income of Negro families was less than half of the general average and that the southern averages were even lower. Negro migration from the rural south continued apace, since by then three-fourths of these farmers had become tenants or sharecroppers. The national Y.M.C.A. celebrated the 50th anniversary of work among Negroes in honour of its first general secretary, William Alphaeus Hunton. Arthur Mitchell was re-elected congressman from the 1st Illinois district, and Crystal Bird Fauset became the first Negro woman member of the Pennsylvania state legislature.

During 1939, under the influence of the Gaines decision, Morgan college, Baltimore, became a state college. Duke university in North Carolina began to participate in extension teaching at North Carolina State College for Negroes, and budget expansions began in almost all of the 19 separate state agricultural and mechanical land-grant colleges. On 14th amendment pleas, equalization suits for teacher salaries won in Maryland, lost in Virginia, but were appealed. The National Labor Relations board ordered mandatory wages instead of gratuities on the plea of the Brotherhood of Red Cap Porters.

Farm tenant evictions caused grave disturbances in Arkansas, Missouri, Oklahoma, but provoked liberal support for rural reforms; peonage suits were instituted in some cases.

Marian Anderson, who had been refused a concert by the Daughters of the American Revolution at Constitution hall, Washington, D.C. (the ban was later lifted), gave an Easter Sunday concert at the Lincoln Memorial under the auspices of a distinguished committee and was later awarded the Spingarn medal for 1939. The 25th anniversary program of the American Society of Composers, Authors and Publishers gave a special concert tribute to W. C. Handy and James Bland. George Washington Carver was awarded the Roosevelt medal for achievements in horticulture and industrial chemistry. Mayor Fiorello La Guardia appointed Jane Bolin a N.Y. municipal judge and Myles Paige to the special sessions bench of the criminal court. In the uni-



Marian Anderson singing at Constitution hall, Washington, D.C. in Jan. 1943, where the audience was seated without segregation at the singer's request. One of the greatest contraltos of her day, Miss Anderson drew packed concert audiences throughout the decade 1937-46

fication of the Methodist Episcopal Churches North and South, two Negro bishops were elected; the first encyclical of Pope Pius XII called for social justice and racial amity.

In 1940 the U.S. supreme court refused to review the *Alston* case circuit court order to Norfolk, Va., to cease teacher salary differentials based on race; salary equalization was agreed to in Louisville, Ky. The National Association for the Advancement of Colored People won its 17th victory in the supreme court *Hansberry* decision outlawing a Chicago real estate restrictive covenant, without passing on the general constitutionality. In the pressures of war preparation, a revised policy of the army was promulgated after a White House conference, and on Oct. 25, 1940, Col. Benjamin O. Davis, Jr., was promoted to a brigadier general and army quota restrictions on Negroes were lifted. Antidiscrimination clauses were attached in congress to bills authorizing aviation and vocational defense training.

The absorption of the Negro into industry from the ranks of unemployment and relief began.

In July 1940 the 75th anniversary of emancipation was celebrated in an exposition with state and federal subsidy in Chicago, and in December the anniversary of the 13th amendment was commemorated by an exhibition and festival at the Library of Congress.

The National Urban league and the Association for the Study of Negro Life and History celebrated their 25th anniversaries.

Under war pressures in 1941 aviation training was initiated for Negro cadets at the Tuskegee airfield, a non-discrimination order was issued for all war defense proj-

ects and finally, in June 1941, President Roosevelt issued the order on fair employment practice, forbidding racial discrimination in industry under war contracts. The supreme court reversed the adverse ruling of the Interstate Commerce commission refusing to compel railroads to provide equal accommodation for Negroes. Equalization of teacher salaries was ordered in Delaware, Kentucky and Maryland, and suits began in eight other states. War industry migration began heavily among the rural Negro population, and disorders broke out in several urban centres like Chicago, New York and Detroit into which they were pouring. Adam C. Powell, Jr., was elected to the New York city council. Harvard university protested the athletic exclusion policy of the naval academy and voted to discontinue athletic relations with schools having such policies, whereupon Navy broke its custom by playing Cornell with Sam Pierce on the Cornell team.

In April 1942 the U.S. navy relaxed its limited quotas for Negro personnel and initiated a large training centre, Camp Robert Smalls at Great Lakes, Ill., and at Hampton, Va. The first Negro marine corps units were activated, the first tank corps and the 93rd division at Fort Huachuca, Ariz., and the 92nd at Fort McClellan, Ala. Gradually, though in separate units except officer candidate schools, the Negro began to get proportional representation in the armed forces. Before selective service, Negro volunteer enlistment rates were 16.1%, nearly double the population ratio. National guard units joined the first expeditionary units over a wide area—Great Britain, Ireland, North and West Africa, Australia, New Guinea, Hawaii. Acute training camp tensions, caused primarily by segregation policies, were finally eased by the appointment of Negro military police and special race-relations officers, but the policy was generally resented and protested by soldiers and civilians alike. The National Maritime union, with an



Negro fliers practising the Morse code as part of their training on the campus of Tuskegee institute, Ala., first U.S. army air school for Negroes. Five young lieutenants, the first to graduate, received their wings March 7, 1942

integration mixed-crew policy, had uniform success, as symbolized by giving a Negro captain, Hugh Mulzac, command of the "Booker T. Washington" with a mixed crew. Dorrie Miller, heroic messman of the Honolulu attack, was awarded the navy cross in recognition by Adm. Chester W. Nimitz, after much public controversy.

Numerous companies were cited under the Fair Employment Practice act in 1941, but gradually fair practice extended itself, especially where C.I.O. unions were in control; although American Federation of Labor policies began to broaden under pressure.

New York state, the War Production board and the War Manpower commission issued nondiscrimination orders; salary equalization for schools was extended to six more states. The supreme court declared the Georgia contract labour law unconstitutional.

In 1943 the Negro service quotas reached the population ratio, with 700,000 men in the army, 5,000 officers, 74,000 men in the navy, 4 pursuit and 1 bomber squadrons in the air forces and token representation in other branches. The 99th pursuit squadron participated creditably in the North African, Sicilian and Italian campaigns, winning citations under Col. Benjamin O. Davis, Jr., and his successor, Maj. George Roberts. Other combat units and many quartermaster and transportation units saw heavy action and received group and individual citations; but there was controversy over the setback of the 92nd division in the Leghorn campaign. Final investigation cleared the troops and placed blame on the higher command.

Resistance to fair practice caused the Committee on Fair Employment Practice to be reorganized twice, and necessitated a re-enforcing presidential order. Eventually, the Negro industrial quota was raised from 5.3% to 7.3% in war industry. War labour migration reached 800,000 with a rough gain of 500,000 in new job employment. Riots in Mobile, Ala., Beaumont, Tex., New York city and a very severe one, June 20-22, in Detroit, alarmed the country;

more than 100 interracial committees were organized to counteract these tensions in various parts of the country.

William H. Hastie was awarded the Spingarn medal in 1943, after resigning as civilian aide to the secretary of war in protest at the continuance of army segregation; his successor was Truman Gibson, Jr. Francis Rivers was chosen a city court justice in New York, and James W. Johnson became collector of internal revenue there.

By 1944 Negro enrolment had reached 701,678 in the army; 425,000 overseas; 148,769 in the navy; 5,707 marine corps; 3,556 coast guard. The navy broke precedent by admitting Negroes to officer commissions, with 28 ensign and lieutenant appointees and admission of Negro women to the WAVES. The F.E.P.C. estimated 1,334,000 war job placements. The U.S. supreme court (*Lonnie Smith vs. Texas*) declared the closed white primary unconstitutional, restrained unions from debarring Negroes from membership and seniority where they had exclusive bargaining rights and outlawed as peonage the Georgia contract labour law for debt. The California supreme court outlawed auxiliary unions for Negroes, declaring closed unions incompatible with closed-shop bargaining rights. New York state passed the Quinn-Ives bill against discriminatory practice in industry. In Philadelphia a protest strike of streetcar employees against the upgrading of Negroes was broken by government intervention. William Dawson was elected to congress from the 1st Illinois district, Adam C. Powell from New York city. Georgia abolished the poll tax and many additional Negroes voted.

Negro army enrolment at the end of World War II in 1945 was 8.67%, approximating the population ratio, 695,264 in all, with 475,950 overseas; navy figures increased to 165,397, 60 WAVES and 50 commissioned officers. In addition to creditable war records of the 92nd and 93rd divisions, many Negro detachments in the air corps, transportation, engineer, tank and artillery saw combat zone service in all theatres, with numerous unit and individual citations; 32 units alone received amphibious invasion awards. The 92nd division sustained 5,752 casualties and received a total of 12,096 awards. Negro army re-enlistments reached an 18% level.

In 1945 a Florida court outlawed the restricted white primary, as did another in Macon, Ga. The Los Angeles superior court ruled that restrictive residence covenants were unconstitutional. As the New York state commission against industrial discrimination began functioning, New Jersey, Wisconsin and the city of Chicago passed similar measures. Many industrial companies began anticipating such rules by more liberal employment and upgrading policies. Irving Mollison, of Chicago, was appointed federal customs court judge in New York; Charles W. Anderson became the first Negro state legislator in Kentucky; Ralph Bunche and Norman Manley of Jamaica were named to the Anglo-American Caribbean commission; Benjamin Davis was re-elected to the New York city council; Rev. David W. Harris, Episcopal bishop of Liberia; Horace M. Bond, the first Negro president of Lincoln university, Pennsylvania.

The American College of Surgeons elected Negro physicians. Booker T. Washington was chosen for the National Hall of Fame, and Paul Robeson became the 30th Spingarn medalist. Pres. Branch Rickey, of the Brooklyn baseball team, signed Jackie Robinson to the Montreal squad branch, the first Negro in big-league baseball.

In 1946 throughout the south, elections showed a large increase of Negroes voting. Georgia registrants increased by 118,387 and even in Mississippi, despite threats and acts of violence, 200 Negroes voted. In reaction Alabama

reverted to state conventions instead of primaries and passed by a small margin the Boswell amendment calling for interpretation of constitution as a qualifying test for voters. Senator-elect Theodore G. Bilbo, however, was brought to trial for illicit campaign practices, including threats and intimidation of Negro voters. Renewed Ku Klux Klan activities, a series of mass lynchings, especially in Webster county, La., and at Monroe, Ga., and the organization of a new "white supremacy" order, the Columbians, in Atlanta, indicated serious reactionary trends. However, all situations were widely protested, south as well as north, and FBI investigations were instigated. Gov. Ellis Arnall of Georgia took steps to outlaw both the K.K.K. and the Columbians, and the Klan had its charter revoked in New York state, New Jersey and California.

The U.S. army announced over-all figures for Negro personnel for the war period as 920,000 men and 7,768 officers and promulgated the Gillem report for better integration of Negroes in all service branches. But when Negro re-enlistments reached 20%, the army proposed a ceiling quota of 10%, which was strongly protested. Interracial public protest meetings, particularly a rally of Sept. 23, 1946, at the Lincoln Memorial, Washington, D.C., high-lighted the Monroe lynchings. The Columbia, Tenn., riot trial attracted nation-wide attention, ending in the acquittal by an all-white jury of 23 of the 25 Negroes charged with murder and inciting to riot. The University of Texas was sued for noncompliance with the Gaines decision, and in June 1946 the U.S. supreme court ruled against the racial segregation of passengers in interstate bus travel. There was considerable relaxation of this procedure also on several railroads. Massachusetts passed a fair employment practice measure, and the American Nurses association voted to admit Negro members. The C.I.O. and A.F. of L. both announced wide-scale drives to organize labour without race restrictions in the south. Negro college enrolment at the end of the decade 1937-46 was 53,030, with 5,264 graduates.

In 1946 William H. Hastie was inaugurated governor of the Virgin Islands. Charles W. Anderson became an assistant attorney general of Kentucky, and both William Dawson and Adam C. Powell were re-elected to congress. Ralph J. Bunche was appointed acting-director of the trusteeship division of United Nations, charged with organizing the division. William O'Hara Lanier took up his post as U.S. minister to Liberia, and by a gift of \$250,000 from Harvey Firestone an American Foundation for Tropical Medicine was announced for that country. It was announced that 12 Negro research scientists had served on the atom bomb research staffs. (See also CIVIL LIBERTIES.) (A. LER. L.)

Negro Culture

The period between 1937 and 1946 was marked by a progressive tendency in the U.S. to accept Negro creative artists and interpreters of the arts without restriction based on racial identity. Previously the custom was to departmentalize the Negro American's cultural gifts. The decade saw the old pattern breached at many points and often wholly disregarded. Whether the reason behind this development was a maturing public attitude, a maturing of the artists themselves or a combination of these and other factors was less important than the fact itself, but in all the arts Negroes aimed at achievements not previously attained by members of their group in the United States. Results were generally creditable, sometimes outstanding, and public approval was on the same scale.

Music.—In music, more than in literature and art, perhaps, this trend had been foreshadowed. The achievement of Roland Hayes, a singer less often referred to as a Negro than as a tenor, was already in the record. Paul Robeson and Marian Anderson had attained eminence. Even in music, however, the new tendency was strongly marked.

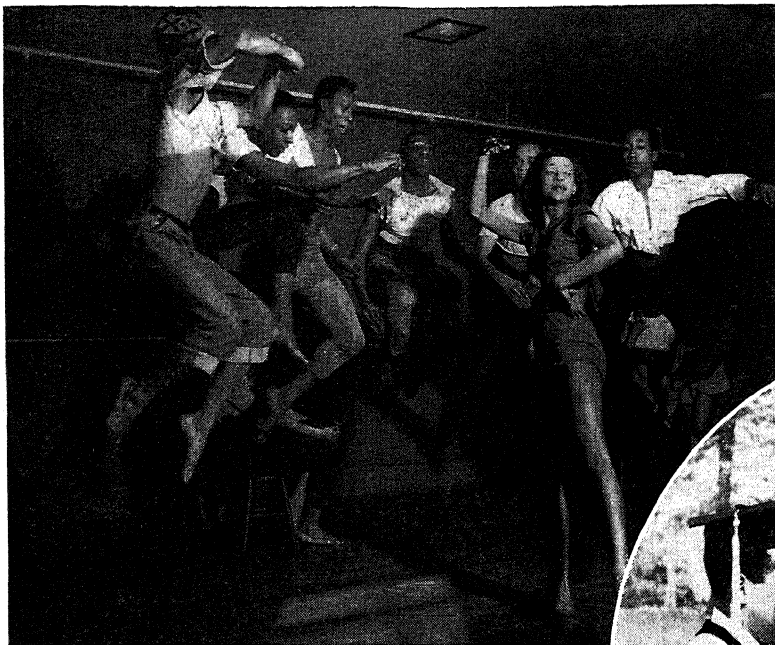
In 1942 Miss Anderson was given the \$10,000 Edward W. Bok award for outstanding achievement by a Philadelphia. The implications of this honour did not go unnoticed. Here at last was a kind of recognition hitherto beyond the experience of Negro artists in the U.S.—a sort of open evaluation previously reserved for sprinters and prize fighters. Coming after this, the Order of African Redemption, bestowed on Miss Anderson by the Liberian government in 1944, may have been in some respects an anticlimax.

The successful New York debut of Dorothy Maynor at Town hall in 1940 did not follow the pattern set by Hayes and Anderson. These American singers were careful to put European triumphs ahead of their appearances before major U.S. audiences. Miss Maynor first attracted widespread attention when she appeared as soloist at the Berkshire Symphonic Festival picnic in Aug. 1939. Her first New York concert was an outstanding musical occasion in November of the same year, and in 1940 she was awarded the Town Hall Endowment Series medal. Extended tours followed and between these a number of important radio appearances before a national audience.

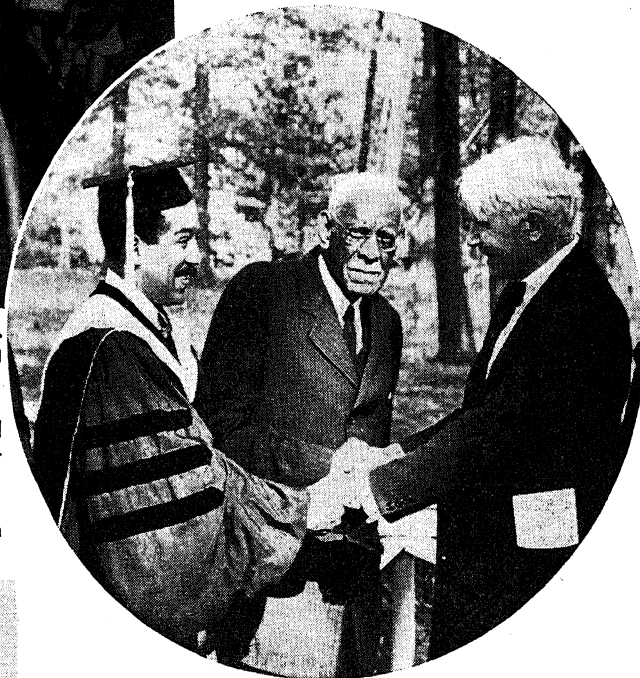
No other new singer arrived quite so auspiciously during the decade, but several showed brilliant promise, and at least one seemed ready to take her place in the company of the great as 1946 ended. As early as 1941 Charles Holland, tenor, and Virginia Lewis, soprano, were widely noticed. In the same year Louise Burge, contralto, made her bow as soloist with the New York Philharmonic and the Schola Cantorum at the Lewisohn stadium in the summer premier of William Grant Still's choral ballad *And They Lynched Him to a Tree*. Muriel Rahn and Anne Wiggins Brown, both sopranos, left the Broadway casts of *Porgy and Bess* and *Carmen Jones*, respectively, to make successful concert tours, including appearances abroad. Muriel Smith was still a school girl when she was given the lead in *Carmen Jones*, but her singing performance was extremely well received. Portia White, soprano, travelled from her home in Halifax, N.S., to please New York audiences and critics in 1944. Kenneth Spencer brought an unusual bass voice with him from the west coast. Edward Matthews, a featured singer on radio programs for several years, was chosen to sing the baritone lead in the Gertrude Stein-Virgil Thompson opera *Four Saints in Three Acts*. Aubrey Pankey appeared in concerts at Town hall. But the only newcomers whose critical and popular receptions seemed on the scale of those accorded Anderson, Maynor, Hayes and Robeson in their debuts were Carol Brice, contralto, and Ellabelle Davis, soprano.

It was after Miss Brice had sung for the Friends of the Boston Symphony at their annual club concert in the spring of 1946 that Conductor Serge Koussevitsky remarked excitedly that her voice was like a cello.

At least three other singers received serious attention. Each was involved in precedent-breaking—Todd Duncan, tenor, by singing the role of Pagliacci with the New York City Opera company; Camilla Williams by her successful portrayal of Madame Butterfly in a production by the New York City Opera company and Ellabelle Davis by singing leading operatic roles in Mexico. Todd Duncan's



Above: Katherine Dunham dancers rehearsing a classical ballet. The Negro company made its debut in New York city during 1940 with the hit program "Tropics and Le Jazz 'Hot' "



Circle: Langston Hughes (left), Negro poet, being congratulated by Carl Sandburg after he was given an honorary degree in literature at Lincoln university, Pa., in 1943

Below: "Hot Lips" Page playing trumpet in 1946 at a Harlem night club in New York city



Below: Richmond Barthé, Negro sculptor who was awarded Guggenheim fellowships in 1940 and 1941, at work on a bust of Booker T. Washington



other activities included singing the role of the crippled beggar in *Porgy and Bess*, George Gershwin's folk opera, and concert tours that extended from New York's Town hall to the cities of Australia. Lawrence Whisonant, baritone, and Anne Wiggins Brown, meanwhile, were selected by Leopold Stokowski as two of the four soloists for his presentation of Beethoven's *Ninth Symphony*. Todd Duncan was soloist with the New York Symphony orchestra in its rendition of the same number.

Precedent of another sort was threatened by the budding career of Phillipa Duke Schuyler, child pianist and composer. Except in the field of popular music, no Negro instrumentalist had received major consideration in the U.S. since the strange musical career of Thomas Greene Bethune, better known as Blind Tom, ended in 1905. Making a public performance at the age of 4, Phillipa came along steadily thereafter. In July 1946, at the age of 15, she made her first appearance with the Philharmonic Symphony orchestra of New York at the Lewisohn stadium, playing the second Saint-Saens piano concerto with high approval from critics and public alike.

The same program was significant to the career of Miss Schuyler as a composer. Though she had played original compositions since infancy, this occasion was remarkable in that the Philharmonic Symphony orchestra, under the direction of Thor Johnson, presented the Scherzo from her fairy-tale symphony *Rumpelstiltskin*.

Two Negro conductors came forward during the decade. Dean Dixon substituted for Toscanini when he first directed the National Broadcasting Co. orchestra. Later he became the first Negro as well as one of the youngest men ever to direct the New York Philharmonic. In these and in a number of other engagements he conducted major U.S. symphony orchestras with an understanding and authority that won enthusiastic commendation. Meanwhile, Rudolph Dunbar, a native of British Guiana but trained in the U.S., followed London and Berlin appearances with a debut before the Hollywood Bowl symphony in the summer of 1946.

As a musical creator, too, the Negro made advances in the U.S. If the efforts of Negro interpreters of serious music had been departmentalized in the past, they had seldom been wholly rejected. Negro composers, however, except as writers of popular songs and arrangers of spirituals and scores for musical shows, had won slight recognition. In this decade both program and abstract music by Negro American composers seemed to receive their due.

William Grant Still, already known and respected in a narrow circle, produced 15 major works, including 7 compositions for large orchestra, a ballet and 3 operas, not to mention many vocal and instrumental solos and choral numbers. His more important works were accorded 149 performances by symphony orchestras in the U.S. and in various parts of the world during that time. Many hundreds of program and concert renditions were noted. Typical of the former were the Chicago Symphony's playing of his *Afro-American Symphony*, under the direction of Hans Lange, and the premier of his *Symphony in G Minor* by the Philadelphia orchestra, directed by Leopold Stokowski, both in 1937. In the nine years that followed, *Old California*, *Plain-Chant for America*, *In Memoriam: The Colored Soldiers Who Died for Democracy*, *Poem for Orchestra*, *Festive Overture* and other compositions by Still were played by outstanding musical organizations from Helsinki, Finland, to Sydney, Australia, from Hollywood bowl to Robin Hood Dell, from Duluth, Minn., to Rio de Janeiro, Brazil.

Some of his works were composed on commission from the Columbia Broadcasting system, the New York World's fair, Paul Whiteman, the League of Composers and the Cleveland orchestra. Meanwhile, Still was the recipient of honours which, for sheer volume, would have delighted almost any composer anywhere. Honorary degrees, Guggenheim and Rosenwald fellowships and extensions, awards and trophies became almost routine with him. In 1944 he won the prize offered by the Cincinnati Symphony orchestra for the best overture to celebrate its jubilee season.

The recognition accorded this Negro composer was perhaps typical. Leading artists continued to sing the art songs of Harry T. Burleigh. The violinist Clarence Cameron White had his *Suite of Negro Folk Tunes* played by the Elizabeth (N.J.) Philharmonic society and other works by symphonic orchestras in Columbus, O., and Fort Wayne, Ind. Another of his compositions was played by Jascha Heifetz and included in an album of Heifetz records. The young composer Ulysses Kay won first prize in the 1946 Fellowship of American Composers' contest with *Of New Horizons*, an orchestral work. In the same contest John W. Work's *The Singers* won the prize for a choral composition and was performed by the Michigan State college choir and orchestra at two performances before the 1946 Congress of American Composers. Work's *Yenvalou*, a suite of three movements for string orchestra, based on Haitian themes, was played at the Saratoga Spa festival. His arrangements of folk songs for chorus, a form in which he showed a special interest and facility, began to suggest the beginning of a genre. He published a number of anthems, art songs and piano pieces.

In the creation and performance of popular music Negro Americans continued to play an important part. At least two new developments were seen. The first, perhaps, was the tendency to experiment which sparked the movement toward "swing." The trend was from sweet to hot and then, within limits, back to sweet again. All of which, if it meant little to the layman, was of vital importance in some quarters. The other development noticed was the integration of Negroes into preponderantly white bands. Benny Goodman was the leader in this movement. He soon had many imitators, however, and eventually preponderantly Negro bands were integrating white musicians into their aggregations. A small manifestation of the period was seen in the inclination of some performers to high light the protest elements inherent in blues and sometimes in other folk music. Among these were Josh White and Huddie Leadbetter.

Literature.—Negro writers made important advances in the U.S. Their progress was typified by the career of Richard Wright. In 1937 Wright was employed by the Writers' project in Chicago. By the spring of 1938 his success was assured. *Time* gave him a big send-off: "The U.S. has never had a first-rate Negro novelist. Last week the promise of one appeared. *Uncle Tom's Children*, the first book of a 29-year-old, Mississippi-born Negro, won a \$500 prize from *Story Magazine* as the best creative work done by any of the 1,200 writers on the Federal Writers' Project. Unlike most Negro writers, Wright is neither subjective nor sentimental. . . . It is this central psychological core of Negro life in the deep South, communicated in clear, unemotional prose, which gives Wright's stories their intensity, and a kind of impersonal eloquence."¹

¹Courtesy of *Time*, copyright Time Inc., 1943.

Native Son, a powerful novel, appeared in 1941 and became one of the important books of the year. Distributed by the Book-of-the-Month club, it achieved a circulation of more than 250,000 in its first season. Later the book was dramatized by the author in collaboration with Paul Green, and the play was successfully produced on Broadway and on the road with Canada Lee in the leading role. The book *12 Million Black Voices*, described by the author as a folk history of the Negro in the U.S., followed in 1941. It was a vibrant bit of writing, but it did not catch on with the reading public as his earlier books had. Wright's next published book more than made up the difference, however. *Black Boy* was even more sensational in 1945 than *Native Son* had been four years before. An autobiographical account of the writer's childhood and youth in the south, the book shocked and aroused thousands of readers who had never before imagined what went on in the mind of a sensitive black youngster growing up in a Jim Crow community. Again the Book-of-the-Month club favoured the author.

While Wright's work received more attention than was paid to the writing of any other Negro American during the decade, he was actually just one of nearly a dozen to be favourably noticed. Zora Neal Hurston's best novel, *Their Eyes Were Watching God*, was warmly received in 1937, and Arna Bontemps came back from a Haitian sojourn with *Drums at Dusk* (1939). Chester Himes, another newcomer, got an astonished hearing with *If He Hollers Let Him Go* (1945). In 1946 Ann Petry won a Houghton Mifflin Literary fellowship with *The Street*, the novel that came nearer than any other of the period to duplicating the success of *Native Son*.

Success of a different kind was achieved by Frank Yerby with *The Foxes of Harrow* in that same year. Helped by book club distribution, Yerby's bright, fast-moving novel reached a total circulation of around 1,000,000 copies in its first year. It was also sold to the movies. All of this was unprecedented. Up to that time no Negro American had published a completely successful work of fiction not dealing narrowly with Negro life. Yerby broke out of the department with great vigour and quickly established himself among the nation's foremost writers of colourful historical romance. While this development was without a parallel in American letters, it had many elsewhere: Alexandre Dumas in France, Alexander Pushkin in Russia and Machado de Assis and others in South America. In a peculiar sense Yerby represented the Negro writer's coming of age in the U.S.

A number of literary autobiographies and works of nonfiction prose received serious attention. Langston Hughes's *The Big Sea* was not only a warm and disarming experience to readers in 1940 but a personal history of continuing interest and significance. Two years later Zora Neal Hurston, a contemporary of Hughes's, recounted her literary adventures in *Dust Tracks on a Road*, a book reflecting her vivid personality. Claude McKay called his experiences *A Long Way From Home* (1937), and W. E. B. DuBois selected *Dusk of Dawn: An Essay toward an Autobiography of a Race Concept* (1940) as a title for his reflections on a full life.

The foregoing, like *Black Boy*, were the memoirs of established writers. But the decade in which they appeared produced several new and arresting writers in the same or closely related fields. J. Saunders Redding's *No Day of Triumph* (1942) was a critique of contemporary Negro life in the south, but the book was also noticed for

stylistic qualities, for its autobiographical features and for the freshness of its observation. The state in which the author was living at the time honoured it with the Mayflower award as the outstanding book of the year by a resident of North Carolina, the first time that accolade had gone to the work of a Negro writer. In the following year, too, the outstanding book by a Negro author was a factual commentary on Negro life. New York's Harlem was examined in Roi Ottley's *New World A-Coming*, and the book became a popular success after receiving Houghton Mifflin's \$2,500 Life-in-America prize. Era Bell Thompson's modest and appealing story of her life was called *American Daughter*. Published in 1946, it showed a Negro girl growing up on the western prairies, beyond the Negro community, and it was praised for qualities missed by some readers in the tougher books dealing with Negro life in the U.S. The decade also saw the publication of notable books by white writers inspired by Negro life, among them Rackham Holt's *George Washington Carver* (1943), Lillian Smith's *Strange Fruit* (1943), Edwin R. Embree's *13 Against the Odds* (1944), Howard Fast's *Freedom Road* (1944), Fannie Cook's prize-winning novel *Mrs. Palmer's Honey* (1946) and the play *Deep Are the Roots* by Arnaud d'Usseau and James Gow.

Poetry.—The most significant writing by Negro Americans in the decade that ended in 1936 had been done by poets: James Weldon Johnson, Claude McKay, Jean Toomer, Langston Hughes, Countee Cullen, Sterling A. Brown and others. The decade that followed was dominated by writers of prose. Johnson was killed in an automobile accident in 1938. Little or nothing was heard from McKay and Toomer. Cullen's *The Lost Zoo* appeared in 1940. He died in 1946 after another period of relative silence. Sterling Brown did not publish. Of all this band of singers who, with their associates, brought about the Negro renaissance of the late '20s and the early '30s, only Langston Hughes carried on with full vigour. In addition to books of prose and fugitive writings he added *Shakespeare in Harlem* (1942), a volume of poems, to the shelf of his works and was ready with another, *Fields of Wonder*, as 1946 ended.

Several new voices were welcomed joyously, however. Margaret Walker's debut in 1942 had the blessing of Stephen Vincent Benét and the encouragement of having her first book, *For My People*, included in the Yale Series of Younger Poets. Melvin B. Tolson's rugged poems were collected in *Rendezvous with America* (1944). Gwendolyn Brooks's *A Street in Bronzeville* (1945) revealed qualities not previously noted in the work of Negro poets. Owen Dodson's *Powerful Long Ladder* (1946) may not have been the one that Jacob saw, but it gave good promise. There was promise too from interesting writers who had not yet achieved full-fledged collections of their work. Robert E. Hayden, twice winner (1938 and 1942) of the Avery and Jule Hopwood award at the University of Michigan, showed by contributions to magazines and anthologies that he was definitely on his way. Moses Carl Holman's prize-winning poem in the John Billings Fiske competition at the University of Chicago disclosed an authentic talent, and Myron O'Higgins' first efforts won the respect of critical readers.

An important collection of writings by Negro Americans, selected and edited by Sterling A. Brown, Arthur P. Davis and Ulysses Lee was brought together in *The Negro Caravan* (1941).

Art.—In the middle and late '20s, two groups of Negro artists were clearly identified in the U.S. Of these, the one most noticed had its centre in New York's Harlem, and its

foremost representative was Aaron Douglas, figure painter and illustrator. Associated with the group were Palmer Hayden, Albert Smith, William Johnson, Rex Gorleigh, Augusta Savage and others. The second group was located in Chicago, to which most of its number had been drawn by the Art Institute. At that time Archibald J. Motley was believed by many to be the individual member of the group most likely to achieve major rank among U.S. artists, but his associates were also promising. They included, among others, Hale Woodruff, Sargent Johnson and Richmond Barthé. By 1937 the two groups had fairly well blended. Together they represented the Negro's main strength in art at the beginning of the decade.

Douglas and Woodruff later associated themselves with the art departments of Fisk (Nashville, Tenn.) and Atlanta (Ga.) universities, respectively, but neither neglected his own painting. At the end of another ten years, each was still prominent in his own field. Meanwhile, Barthé, relatively inconspicuous as a member of the Chicago group in the '20s, had at the age of 45 won a place among the best living sculptors in the U.S. His bust of Booker T. Washington, placed in the Hall of Fame in 1946, came at the end of a productive period which saw his small statuary acquired by the Metropolitan Museum of Art and by other leading collections around the world. The same years saw his large groups and heroic figures conspicuously placed in New York and elsewhere.

Meanwhile, much new talent emerged, encouraged first by the Harmon foundation in New York, later by the Federal Arts projects and then by annual shows sponsored by Atlanta university. In 1946 the Albany (N.Y.) Institute of History and Art presented a major exhibit of Negro American art, a show which in its travels drew sharp attention to such newcomers as the 58-year-old Horace Pippin, Jacob Lawrence and Eldzier Cortor. Pippin, whose initial work was done with a hot poker on wood, had his work first exhibited in 1937 at a show arranged by Dr. Christian Brinton of the West Chester Art centre in Pennsylvania. His canvasses were later purchased by the Whitney museum, the Philadelphia museum and many other galleries. Lawrence was precocious. By 1946, when he was 28, his paintings had been bought by 12 museums in the U.S. In 1942 his migration series was featured in *Fortune*. Four years later his work was on the cover of that magazine. At the same time Cortor, two years older, was coming along fast in Chicago where his work won prizes at the Art Institute.

Other newer talents included Charles Alston, William E. Artis, Henry Bannarn, Romare Bearden, Eloise Bishop, Selma Burke, Elizabeth Catlett, William Carter, Charles Davis, Zell Ingram, Joseph Kersey, Charles Sebree, Charles White and John Wilson. (A. Bs.)

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Nehru, Jawaharlal

Nehru (1889–), Indian statesman, was born of wealthy parents and was educated at Harrow and Old Trinity college, Cambridge, England. Admitted to the bar in London, he returned to India to participate in the movement for Indian independence. He became a member of the All-India Congress committee in 1918, was arrested repeatedly for political offenses and was associated with the various civil disobedience movements in India after 1921. He was twice president of the Indian Congress party, in 1929 and 1936, and was generally regarded as the most important Indian leader next to Gandhi. More radical than the latter, he urged the need for a socialist, nationalist and anti-British program. His autobiography, written in prison, was widely circulated in Great Britain and in the United States, where it was published under the title *Toward Freedom*. Nehru demanded complete independence for India rather than dominion status. After the Japanese attack on Pearl Harbor, however, he espoused the Allied cause. He was nevertheless arrested and imprisoned in Aug. 1942, along with Gandhi and a large group of Congress party leaders, and was not released until June 1945. In July 1946 Nehru assumed virtual leadership of his party when he was named president of the Congress party. When Britain announced its program for Indian independence, Nehru became leading minister in the interim government. In Oct. 1946 he resigned the party presidency.

Nejd

See ARABIA.

Nelson, Donald Marr

Nelson (1888–), U.S. business executive and public official, was born Nov. 17, 1888, at Hannibal, Mo. Graduated from the University of Missouri in 1911, he was employed the following year by Sears Roebuck and company as a chemical engineer. In 1927 he was appointed general

merchandise manager of the company, in 1930 vice president in charge of merchandising, and in 1939 executive vice president and chairman of the executive committee. He served with the National Defense Advisory commission in 1940, and as director of purchases for the Office of Production Management in 1941. In Aug. 1941, President Roosevelt named him executive director of the Supply Priorities and Allocations board. This agency was supplanted in Jan. 1942 by the War Production board, with Nelson as chairman and with authority over the whole U.S. war procurement and production program. By the end of 1943 the production battle was no longer urgent. In late autumn Nelson visited Europe, where he conferred with Stalin and inspected Russian war plants. He was sent to China in Aug. 1944 as President Roosevelt's personal representative to Chiang Kai-shek. Late in September Nelson returned to Washington with Chiang's approval of plans to bring more of China's industrial potential into the war against Japan. After resigning from the WPB, Nelson accepted an appointment from President Roosevelt to act as the latter's "personal representative" to China. Given cabinet rank, he was assigned the task of organizing a counterpart to WPB in China. In May 1945 Nelson resigned as personal presidential representative to foreign governments. The following month he assumed the presidency of the Society of Independent Motion Pictures Producers.

Neoprene

See CHEMISTRY.

Nepal

An independent state, situated on the northeastern frontier of India, Nepal lies between $80^{\circ} 15'$ and $88^{\circ} 10' E.$, and $26^{\circ} 20'$ and $30^{\circ} 10' N.$ Area: 54,000 sq.mi. Pop.: (est.) 5,500,000. Capital: Kathmandu (108,800). Language: Gurkhali, Newari. Religion: Buddhism, Hinduism.

The hereditary prime ministers and sovereigns of Nepal during the decade 1937-46 were: Maharaja Sir Joodha Shum Shere Jung Bahadur Rana (until Nov. 29, 1945); General Sir Padma Shum Shere Jung Bahadur Rana (after Nov. 29, 1945).

The chief event of the decade was the retirement on Nov. 29, 1945, of the hereditary prime minister and *de facto* ruler, Sir Joodha Shum Shere Jung Bahadur Rana, after 13 years in office. He was succeeded by his nephew, Sir Padma Shum Shere Bahadur Rana, grand commander of the star of India. The former prime minister was the author of many administrative reforms in the military, judicial and educational departments. He did a great deal for improving trade and communications; match factories, and jute, rice and sugar mills were erected, and an important hydroelectric plant was installed. He started the Bank of Nepal in 1937, and banknotes were put into circulation for the first time. He played a leading part in the organization of relief and reconstruction after the disastrous earthquake of 1937.

Nepal played a prominent part in World War II. Though it had a population of only 5,500,000, the number of Gurkha battalions in the Indian army was raised from 20 to 40, and more than 100,000 men were recruited for the Gurkha brigade. In addition, Nepal sent nine battalions on active service, and they won ten Victoria crosses. The viceroy and commander in chief of India both paid visits to the state during 1945; the latter took the salute at the homecoming of the Nepalese contingent. (H. G. RN.)

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Nervous Diseases

See MEDICINE; PSYCHIATRY.

Nervous System

Affections of the nervous system received incessant research from the entire medical world during the decade 1937-46. It was during this time that the various sulfonamide drugs and penicillin were developed. Electric convulsant therapy (electric shock) for various mental afflictions was developed into almost a therapeutic miracle in psychiatry, especially for melancholia, confused or toxic psychoses, early obsessional and compulsion states, postpartum psychoses and a small percentage of schizophrenic-like psychoses. Epilepsy received considerable research with newer methods of diagnosis such as electroencephalography and new drugs for its treatment such as dilantin and tridione. Further, such drugs as quinine were found to be an almost specific cure for certain muscular diseases such as myotonia congenita and dystonia. The very disabling and sometimes fatal disease poliomyelitis (infantile paralysis) was the recipient in 1941 of the greatest advances made in the study of a single disease. Although the causative factor of the disease was not discovered, its sources of entry in the human body were found to be, in addition to that by way of air contamination, via the stomach and bowel. If such a concept proved to be correct, prophylactic procedure should prevent infantile paralysis. The National Foundation for Infantile Paralysis in the United States contributed financial support toward such studies.

During the decade considerable work was done in regard to injuries to the peripheral nerves. A new method of examining an injured peripheral nerve and muscle was developed, so that it was possible to determine potential recovery of the involved muscle long before the patient was able to move the paralyzed muscle or muscles. It was obviously a real contribution to the neurologist who very frequently had to give an opinion as to the outcome of a given peripheral nerve injury.

From the many contributions enumerated above, one should be curious to know how they have worked out in their practical application. Certainly the "sulfa" drugs had almost entirely removed abscesses of the nervous system from existence. Mastoiditis and abscesses were, for all intents and purpose, not seen any more. Similarly, victims of the dreaded epidemic spinal meningitis who had a previous death rate of 50% to 60% now enjoyed almost 100% recovery. Penicillin in combination with the "sulfa" drugs cured cases of pneumonic and other forms of meningitis which previously never recovered. Electric convulsant therapy had been, after its introduction by L. Bini and U. Cerletti of Italy, the most potent factor in the management of diseases of the mind mentioned above. This form of therapy was unequivocally proved to be an almost miraculous "drug" in psychiatry. In epilepsy, dilantin proved to be valuable in arresting many major attacks. Its value lies in the fact that it does not produce any drowsiness such as the older drugs did. Occasionally phenobarbital has to be given in conjunction with it. The management of this condition must be in the hands of a physician. Tridione was tried in 1945 and showed some evidence of effectiveness in stopping minor attacks of epilepsy. Electroencephalography (brain wave measurement) was of practical value in some instances of epilepsy. Quinine proved to be an almost certain cure for myotonia congenita. (See also INFANTILE PARALYSIS; PSYCHIATRY.)

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(T. T. S.)

Netherlands

An independent kingdom in northwestern Europe, the Netherlands is bounded N. and W. by the North sea, E. by Germany and S. by Belgium. Area (Dec. 31, 1942; excluding the interior waters): 12,867.7 sq.mi., four-tenths of which lay below sea level at high tide; pop.: (1938 census) 8,728,560; (Oct. 1946 est.) 9,479,000. Language: Dutch. Religions (1930 census): Dutch Reformed Church 2,732,300; other Protestants 876,960; Roman Catholics 2,890,000; Jews 111,000; other creeds 180,900; no religion 1,144,400. Chief cities (1938 est.): Amsterdam (793,526); Rotterdam (612,372); The Hague (seat of government, 495,518); Utrecht (163,559). Ruler: Queen Wilhelmina Helena Pauline Maria. Prime ministers during the decade 1937-46: Dr. Hendrick Colijn (May 26, 1933-July 27, 1939); Jonkheer Diek Jan de Geer (Aug. 9, 1939-Sept. 4, 1940); Professor Pieter Sjoerds Gerbrandy (Sept. 4, 1940-June 23, 1945); Professor Willem Schermerhorn (June 23, 1945-May 18, 1946); Dr. Louis Josef Maria Beel (after July 2, 1946).

Rejoicing and Anxiety.—The year 1937 opened with general rejoicings in the Netherlands. Princess Juliana, Queen Wilhelmina's only child and heiress to the throne of the Netherlands, was married on Jan. 7 at The Hague to Prince Bernhard zu Lippe-Biesterfeld. The event came as a welcome break in a period of growing anxiety; for, politically as well as economically, the Netherlands was feeling the effects of world trends and, more particularly, of its eastern neighbour's nationalistic policies and determined attempts at autarky. The general election on May 26 (*see* ELECTIONS), held under the constitutional provision of four-year elections to the lower chamber of the states-general, left Prime Minister Colijn in office but produced a reconstituted cabinet, representing a coalition between Protestants and Catholics in which only the largest parties of the two denominations held seats. Foreign policy, which for more than 15 years after the end of World War I had been simply to support the League of Nations and its principles, was reverting to the traditional neutrality of pre-1914 days under the effects of the League's acquiescence in certain acts of aggression and its consequent loss of prestige. In common with Norway, Sweden, Denmark, Finland, Belgium and Luxembourg, the Netherlands had signed the Oslo convention; this convention was an expression of a common outlook and an economic pact rather than a document establishing political aims and duties. Princess Juliana's first child and heiress-at-law, Princess Beatrix Wilhelmina Armgard, was born on Jan. 31, 1938. Italy's conquest of Ethiopia received a late *de facto* recognition by the Netherlands on Feb. 14; a year later, on Feb. 23, 1939, followed the recognition of Gen-

eral Francisco Franco's new government in Spain.

Because of differences of opinion with his colleagues on the subject of national defense, Dr. J. A. de Wilde, minister of finance in Colijn's cabinet, resigned on May 21, 1939. Further disagreements over the same subject caused the collective resignation of the cabinet on June 29, and the new government which Colijn succeeded in forming on July 25 was overthrown only two days later by a plain vote of nonconfidence in the lower chamber. On Aug. 6, 1939, Princess Juliana gave birth to a second daughter, Irene Emma Elisabeth; and on Aug. 9 Jonkheer D. J. de Geer became prime minister, at the head of a broadened cabinet in which, for the first time in Holland's history, the Social-Democrat party was represented.

Events were moving swiftly toward World War II. Still struggling to avert it, the foreign ministers of the signatories of the Oslo convention assembled in Brussels, and on Aug. 28, 1939, King Leopold issued on their behalf a peace appeal. Precautionary general mobilization was ordered in Holland on the same day. Netherlands neutrality was re-affirmed a day later in a public declaration by Queen Wilhelmina. The king of the Belgians and Queen Wilhelmina, acting together, offered their good offices as mediators to Germany, Poland, Great Britain, France and Italy, also on Aug. 29. Both efforts proved fruitless.

Eight Months of Uneasy Neutrality.—The Netherlands' declared policy of strict neutrality carried with it the duty of forbidding the passage of foreign armed forces over the national territory. Hence the precautionary mobilization of Aug. 28, 1939, and all subsequent defensive dispositions during the anxious eight months before Holland was invaded. No effort on the Netherlands' part could produce an army capable of doing more than delay an invader's forces for a short time, pending the arrival of foreign troops, heavy equipment and, above all, air forces.

It is necessary for the sake of historical accuracy to express the matter in these impartial terms, though there was never any doubt in fact that invasion, if it came, would come from the German side. The first threat of this kind came in the opening week of Nov. 1939, when the Germans assembled heavy troop concentrations along the border. In answer, the Dutch military authorities took all steps necessary for the immediate flooding of the so-called inundation zone. The carefully regulated flooding of areas beyond the Netherlands army's utmost capacities of defense, with ruthless concentration upon the defense of inner areas, had always been Holland's only means—often successful—of standing up against superior attack.

King Leopold of the Belgians visited The Hague on Nov. 10, 1939, and once more he and Queen Wilhelmina addressed telegrams to the rulers of Britain, France and Germany with the object of initiating negotiations. A state of siege, in the meantime, had been declared for the most threatened areas of Holland. A number of false alarms punctuated the winter months, but it was not until April 1940, after the German invasion of Norway, that the threat of attack against the Netherlands became unmistakable and immediate. All military leaves were cancelled on April 9, and a state of siege was extended over the whole national territory on April 13. On May 3 the most prominent men of the Netherlands National Socialist party, numbering 21, all of whom were suspected as would-be helpers of a Nazi invasion, were arrested and interned.

The Five-Days' Campaign.—The invasion came in the early hours of May 10, and in order to create confusion at once at the centre of government, air raids were staged



U.S. soldiers strolling with Dutch children. The youngsters were quartered at Hoensbroek castle, the Netherlands, in charge of nuns

against The Hague at 5 A.M. and again at 10 A.M., while the aerodromes of Schiphol, Bergen, Waalhaven, De Kooy, Soesterberg, Haamstede and Hilversum were systematically bombed; mines were dropped from German aircraft along the Dutch coast in order to stop Dutch vessels from running out and Allied vessels from running in with reinforcements and supplies. In retrospect, it was easy to see that only one thing could have made any worth-while difference in the length of time the Dutch forces could have held up the invasion. If large numbers of men, fully skilled in the use of the most powerful anti-aircraft equipment, together with such equipment in almost unlimited quantities, had been available, the traditional water defense might have presented the Germans with a serious obstacle. As it was, local defense successes could make no difference. It was not, incidentally, until three hours after the air attacks had started that the German ambassador presented any kind of communication from his government. When it came it contained the suggestion that all resistance should cease at once. It was rejected by the Dutch government with a declaration that, by reason of the German attacks, a state of war existed automatically between the Netherlands and Germany.

At the end of the second day, although the Germans had broken through in a number of places, the general position on the eastern front still did not cause anxiety. The approaches to Holland proper, the vital inner defense zone, were still intact. But the northern provinces had been lost, and in the southeast the situation was serious. It was still hoped that Allied forces (French), coming from Belgium, would be able to retake the important Moerdijk bridges and thus stop the Germans from making contact with the air-borne troops dropped around Dordrecht and in the island of IJsselmonde. But the appeal addressed to the Allies for immediate help could not effectively be complied with; they were hard pressed themselves. More and more German air-borne troops and parachutists established themselves within the inner defense zone; Dutch efforts to

dislodge them proved unavailing. On May 13, to establish constitutional conditions in which the war could be continued even if the German invasion forced a military surrender, the Netherlands government decided to transfer itself to England. By that time the Dutch air force had been practically wiped out.

The general situation grew worse during the next 24 hours, and on May 14 General Henri Gerard Winkelman, the Dutch commander in chief of land and sea forces, received an ultimatum that unless resistance ceased Rotterdam and Utrecht would be destroyed by air attack at once, and the same fate would overtake all other Dutch towns within a short time. Before the expiration of the ultimatum Rotterdam was subjected to a murderous air attack which destroyed the whole centre of the town, killed 900 people, destroyed 25,000 dwellings and rendered 78,000 people homeless.

The Dutch supreme command was faced with the alternative of holding out for another day, or two at most, at the cost of the destruction of most of Holland's ancient towns and the loss of many thousands of lives, or capitulation. General Winkelman, carefully exempting the troops in Zeeland and the naval forces as not coming within his command, capitulated on the afternoon of May 14. In order to enable as many ships as possible to take part in the continuation of the war, all vessels at Den Helder had been allocated to the commander of the naval forces during the morning, with orders to proceed to England.

Under the Occupation Regime.—The Dutch never accepted the German contention that, for them, the war was over. Listening in secret to the forbidden broadcasts from London, they acknowledged only the Netherlands government in London, and their acts of resistance and sabotage grew more audacious as time passed. Arthur Seyss-Inquart, an Austrian National Socialist, was appointed reichskom-

missar for the Netherlands on May 29. Under a decree of Oct. 4, 1940, Jews and half-Jewish descendants of mixed marriages were barred from official posts. Leyden university and Delft technical high school were the first seats of higher education to be closed because of their resistance to the dismissal of Jewish professors. Strikes and riots at Amsterdam, Hilversum and Zaandam in Feb. 1941 led first to collective fines upon whole communities, then to even more cruel forms of repression. Compulsory labour service was imposed in May, and in December of the same year the National Socialist party became the only permitted political grouping, all other parties being proscribed. The deportation of Jews to Germany grew to an average of 600 a day by July 1942. Anton Mussert, leader of the Dutch National Socialist movement, was allowed to set up a "state political secretariat" in Feb. 1943. In March, industries were cut down to work useful to the German war effort, and at the same time there began the mass deportations of Dutch workers to the reich which the Germans tried to enforce by means of cancelling defaulters' identity and ration coupons. The result was that scores of thousands of Dutchmen "went underground"; they lived in hiding and used forged papers. A declaration of "loyal submission" was demanded of would-be students of all centres of higher education, resulting in attendances being brought down to practically nil, and finally in closure of the universities.

The Allied counterinvasion of the continent in June 1944 brought the occupation authorities' measures to a new degree of oppression. When Allied troops penetrated into the south of Holland in Sept. 1944, the railways ceased to function by order of the Netherlands government in London so that German defense preparations should be impeded, and Holland entered upon the last seven months of the occupation in conditions of rapidly growing famine. For the greater part of the winter the only ration distribution was soup from communal cook-houses; people burned their garden fences and furniture for fuel, and 25,000 died of hunger before the German surrender.

Within the last months of their occupation the Germans flooded 775 sq.mi. of Dutch territory, much of it without the excuse of military advantage; a particularly bad example was the Wieringermeer Polder. The Allies, to make the German defense of Antwerp impossible, had breached the dykes of Walcheren by air attack, adding another 60 sq.mi. to the flooded area. This meant that Holland's struggle for recovery began with the handicap of more than one-tenth of its total area of cultivation under water. Almost one-half of this was salt or brackish water; several years would pass before the soil could return to normal productivity.

The Government in London.—The royal family arrived in England on May 13, 1940, the members of the cabinet one day later. Princess Juliana stayed only a few weeks, moving on with her two children to Canada, where she remained up to the eve of the return to Holland. The prime minister, Jonkheer D. J. de Geer, resigned on Sept. 4 and was replaced by Professor P. S. Gerbrandy.

As the result of dispositions taken by the government at the moment of invasion, the Netherlands was able to contribute 2,500,000 tons of shipping to the Allied war effort. The smaller vessels took part in Britain's food and fuel distribution which, particularly in the days of the great German air attacks, was dependent on coastal traffic; the larger ships served as transports and freighters in every part of the world. Dutchmen of military age were enlisted in the Princess Irene brigade and in Dutch squadrons of

the various Allies' air forces. Their numbers were not large, but the cumulative effort always remained on the increase.

Dutch forces took part in the counterinvasion. Prince Bernhard served with the invading armies and, on Sept.

Netherlands: Statistical Data

Item	1938		1945	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate				
United States . .		1 florin = 55 cents		1 florin = 37.93 cents
Great Britain . .		8.56 = 8.59 florins = £1		
Finance				
Government	\$487,875		\$811,158*	
revenues . . .	(£99,790)		(£201,031)	
Government ex-	\$581,005		\$2,494,515*	
penditures . .	(£118,839)		(£618,219)	
Gold reserves .	\$803,681		...	
	(£164,386)			
National debt .	\$2,192,659		\$6,711,865*	
	(£448,488)		(£1,663,411)	
Transportation				
Railroads . . .		2,278 mi.		1,753 mi.†
Highways . . .		15,793 mi.		8,064 mi.†
Navigable water-				
ways		4,816 "		4,229 mi.†
Airways . . . .		...		463 mi.†
Communication				
Telephones . .		433,927		298,728†
Radio sets . . .		591,733		542,000†
Minerals				
Coal		14,867,822 tons		6,531,892 tons
Peat		881,840 "		...
Lignite		188,493 "		143,463 tons
Salt		181,070 "		210,689 tons†
Crops				
Potatoes		3,273,831 tons		2,856,444 tons
Fodder beets . .		3,166,687 "		...
Sugar beets . .		1,674,945 "		495,199 tons
Rye		607,478 "		227,252 "
Livestock				
Poultry		30,521,292		3,118,196
Cattle		2,763,453		2,277,105
Swine		1,537,783		768,733
Sheep		654,251		400,746
Sea products				
Total		248,669 tons		
Herring		107,808 "		
Plaice		9,053 "		
Haddock		8,554 "		
Manufactures				
Textiles	\$102,622	...		
	(£20,990)			
Clothing	\$62,613	...		
	(£12,807)			
Food	\$45,001	...		
	(£9,205)			
Exports				
Total	\$571,629	15,906,000 tons	\$239,208†§	5,748,853 tons†
	(£116,921)		(£59,283)	
Vegetable oils and				
fats	\$24,907	222,000 "	\$385†§	1,937 " †
	(£5,094)		(£96)	
Wireless ap-	\$24,664	9,000 "	\$11,571†§	2,090 " †
paratus	(£5,045)		(£2,868)	
Butter	\$24,085	62,000 "	\$1,727†§	2,391 " †
	(£4,926)		(£428)	
Ships and aero-	\$23,896	111,000 "	\$2,778†§	10,794 " †
planes	(£4,888)		(£686)	
Imports				
Total	\$778,250	25,109,000 tons	\$155,102†§	5,282,550 tons†
	(£159,184)		(£38,439)	
Machinery . . .	\$62,319	126,000 "	\$14,316†§	25,134 " †
	(£12,747)		(£3,548)	
Wood and timber	\$35,748	1,740,000 "	\$6,910†§	196,743 " †
	(£7,312)		(£1,713)	
Corn	\$26,565	1,008,000 "	\$66†§	712 " †
	(£5,434)		(£16)	
Coal	\$24,718	5,418,000 "	\$6,009†§	1,211,170 " †
	(£5,056)		(£1,489)	
Defense				
Standing army				
personnel . . .		41,200		
Reserves		200,000		
Standing air force				
personnel . . .		600		
Military expen-	\$71,555			
ditures	(£14,636)			
Education				
Elementary schools		7,812		
Students		1,242,778		
Secondary schools		288		
Students		62,301		
High schools . .		4		
Students		3,037		
Universities . .		6		
Students		9,471		

*1944. †1946. ‡1943. §1945 value of florin used in conversion.



The Nijmegen bridge across the Waal river in the Netherlands under British guard. Capture of the bridge by British and U.S. troops on Sept. 21, 1944, was a valuable gain in the Allied drive into Germany

3, 1944, became commander of the Netherlands forces under the supreme command of Gen. Dwight D. Eisenhower, which included the command of armed resistance in the Netherlands.

Through *Radio-Oranje*, with two daily broadcasts prepared by Dutch editors and delivered by Dutch speakers, the population of occupied Holland was provided with a trustworthy news service which proved of great value in maintaining morale and stiffening resistance.

When the news of the Japanese attack on Pearl Harbor reached London, the government immediately declared war against Japan, on Dec. 8, 1941; a year later, almost to the day, Queen Wilhelmina made an official declaration of far-reaching importance: as soon as both the homeland and the overseas territories were free again, steps would be taken to reconstruct the Netherlands kingdom on the basis of co-equal partnership between all its components. Princess Juliana's and Prince Bernhard's third daughter, Margriet Francisca, was born in Canada on Jan. 19, 1943; their fourth, Maria Christina, was born Feb. 18, 1947.

The first parts of Holland liberated by the advancing Allies were districts of the provinces of Limburg and Brabant, and as they became free, the wartime cabinet was broadened by replacing a number of its members with men from these liberated regions. Queen Wilhelmina herself arrived in the free part of Holland on May 3, 1945, accompanied by Princess Juliana who had returned from Canada. They were thus both on Dutch soil when the Germans surrendered on the following day.

May 1945–Dec. 1946.—The wartime cabinet, having fulfilled its task, resigned on May 16, 1945. Immediate elections being impossible in the chaotic state of the country and of all official registers, it was replaced by a "stop-gap" government under the prime ministership of Professor W. Schermerhorn, the leader of the *Volksbeweging* (People's movement) of which he had been one of the prime organ-

izers while still in internment under the Germans. Practically all the new ministers were men who had been prominent in various groups of the resistance movement, and the all-important task was reconstruction in every form. Enormous difficulties were encountered in this respect because of the Germans' large-scale destruction of bridges, wharves and quaysides in the ports and their removal into the reich of a great deal of Holland's railway material. To counteract inflationary tendencies resulting from the occupation, the whole of the old note issue was called in during the last week in September to form blocked bank deposits. New notes were issued in strictly rationed quantities, and a great improvement was effected. Holland experienced its most serious postwar shock when the Japanese capitulation, instead of leading to a quick, joyful reunion with the Netherlands Indies, was followed by the realization of grave difficulties to come from that area (see NETHERLANDS COLONIAL EMPIRE).

The first postwar general election was held on May 17, 1946, and revealed the Catholic People's party as the strongest party, with William Schermerhorn's Social Democratic party a close second. A coalition cabinet under the prime ministership of L. J. M. Beel was announced on July 2, the outgoing prime minister becoming chairman, a few weeks later, of the commission-general (three members) appointed by the new government to go to Java for negotiations with the Indonesians.

The enormous material and economic damage wrought by the Germans crystallized Dutch claims for reparations into a demand for territorial compensation by way of frontier rectifications and a number of mining concessions in adjacent German areas. On Nov. 5, 1946, in the form of a memorandum, this was simultaneously presented in Washington, London, Moscow and Paris, involving an area of 775 sq.mi. (See also CURAÇAO; NETHERLANDS COLONIAL EMPIRE; NETHERLANDS INDIES; SURINAM [DUTCH GUIANA].) (E. N. v. K.)

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Netherlands Colonial Empire

An autonomous part of the kingdom of the Netherlands, the colonial empire under the constitution of 1922 consists of the territory of the Netherlands, the Netherlands East Indies, Surinam and Curaçao. Total area (excluding the Netherlands) c. 789,900 sq.mi.; total pop. (est. 1940) 70,760,000.

The Netherlands East Indies constitute the overwhelming part of the empire: 93% in area and 99.6% in population. They comprise five large islands (Sumatra, Java, the southern part of Borneo, Celebes and the western part of New Guinea), a dozen medium-sized islands and many hundreds of small ones. Total area: 735,267 sq.mi. Pop. (1930 census) 60,727,233; (est. 1940) 70,416,000 of whom 250,000 were Europeans and 1,750,000 Chinese; almost

70% of the total population of the N.E.I. lived in 1940 in densely settled Java and the adjacent small island of Madura. Chief towns: (pop. est. 1940): Batavia (cap., 437,000); Surabaya (or Soerabaja) (313,000); Bandung (or Bandoeng) (167,000). The native population of the N.E.I. is described as Indonesian, with the main exception of New Guinea, where it is Papuan. However, there is no racial uniformity from island to island and even from the coast line to the interior of the major islands. Some 60 languages are spoken, of which Javanese is the most important. The main religion is Mohammedan but there were also (1930 census) 2,120,200 Christians (1,630,900 Protestants and 489,300 Roman Catholics), c. 1,250,000 Brahmans (Bali and the western part of Lombok), c. 1,000,000 Buddhists and an unknown number of pagans. Governor general for N.E.I.: Jonkheer A. W. L. Tjarda van Starkenborgh Stachouwer (June 8, 1936–March 7, 1942); Dr. Hubertus Johannes van Mook (appointed lieut. gov. by the Dutch government in London in 1942, when Jhr. Tjarda was interned by the Japanese).

The Netherlands West Indies is the name given to the two Dutch possessions in the western hemisphere: Surinam and Curaçao. The former, called also Dutch Guiana, is a colony in northeastern South America. Its area is 54,291 sq.mi. and the population was estimated on Dec. 31, 1943, at 167,836, not including some 25,000 bush Negroes and Indians in the interior. About 45% of the total population is East Indian or Javanese, the largest such proportion in the western hemisphere. Chief town: Paramaribo (cap., 54,853). Governors: J. C. Kielstra (Aug. 16, 1933–Jan. 2, 1944); J. C. Brons (after Jan. 3, 1944).

The colony of Curaçao consists of two groups of three islands each off the northern coast of Venezuela. Total area: 403 sq.mi.; pop. (est. Dec. 31, 1943) 119,585. The largest is the island of Curaçao itself (210 sq.mi.; pop. 73,343); it includes the capital of the colony, Willemstad (pop. 33,000). Governors: G. J. J. Wouters (April 7, 1936–May 20, 1942); Dr. Pieter A. Kasteel (after May 21, 1942).

Prelude to War.—Situated at the crossing of the roads between Asia and Australia, between the Pacific and Indian oceans, the N.E.I. were naturally influenced by events in the surrounding countries, and particularly by the ebb and flow of political and economic power on the mainland of Asia. In the decade 1937–46, the position and policy of Japan were therefore of paramount importance for the N.E.I. By its presence alone, as an Asiatic empire with vast military and economic resources and following a determined expansionist policy, it continued to impress the Indonesian nationalist movement in its various branches, as it had done at the beginning of the century, when Japan's victory over the Russian empire stimulated the political awakening of the Asiatic peoples.

From the historian's point of view, the years from 1937 till 1941 can be considered as the prelude to the Pacific war, and the N.E.I.'s part in it. Expenditure for defense (navy and army) rose steadily; in a budget totalling Fl.576,000,000, military expenditure in 1937 amounted to Fl.100,000,000 rising in the following two years to Fl.151,200,000 and Fl.162,000,000, and from 1940 onward (when the mother-country was overrun by Germany and the N.E.I. therefore stood alone) to Fl.169,000,000, reaching a summit of Fl.559,800,000 in 1941 (1 U.S. \$ = 1.8 florin in 1941).

Notwithstanding such heavy financial burdens, the planned economic policy pursued by the government during the first years of the decade showed favourable results. This policy had a two-fold aim: to increase the total national income by developing production—mainly agri-

cultural—and a more even and equitable distribution of this income over all groups of the population, in particular in favour of the rapidly increasing Indonesian population (in Java 23,000,000 in 1895, against more than 48,000,000 in 1940). This economic policy and its results also influenced the relations between the Europeans and the Indonesian population generally in a beneficial way. The old "imperialistic" relations, the contrasts between the "poor toiling Oriental" and the "wealthy European overlord" of the old days were fading, and there came to exist a situation in which both elements of the population felt more like colleagues with parallel instead of contrasting interests.

In these circumstances the political situation, insofar as the masses of the Indonesian population were concerned, remained undisturbed. The intellectual nationalists, however, found too little satisfaction for their ideals and ambitions. After the constitutional reforms of 1922 and 1927, which granted a large measure of autonomy to the N.E.I. in internal affairs, political development regarding imperial relations between the N.E.I. and the kingdom of the Netherlands (in which the parliament at The Hague occupied a pivotal position), made no substantial progress. The attention of the government was more concerned with internal reforms within the N.E.I.; provincial and local councils were established, providing the masses of the people with an opportunity to gain experience of democratic methods and ideas in the local sphere.

Isolation.—The occupation of Holland in May 1940 by the German armies and the subsequent establishment of a Netherlands exile-government in London brought about important changes. The overseas territories of the Netherlands were now cut off from the metropolis of the state; the imperial functions of parliament ceased. For five years a common allegiance to the crown, held by the House of Orange, was the only bond which kept the four parts of the kingdom together. The N.E.I. successfully withstood this shock. Full mobilization of all military and economic resources of the country as a preparation for future events was carried by the support of all classes and races. A native militia was introduced. The fate of Holland stirred sentiments of loyalty hitherto latent among the Indonesian peoples. Answering these sentiments, the queen of the Netherlands on the first anniversary of the German invasion (May 10, 1941) issued a statement from London, that on the liberation discussions would be initiated at The Hague where the overseas territories would be equally represented to discuss the political reorganization of the kingdom.

Meanwhile, after the occupation of Holland, a statement was issued by the Japanese government expressing its solicitude about the maintenance, in the interests of peace and stability in east Asia, of the status quo of the N.E.I. The presumption of Japanese leadership in Asia which this statement implied was soon to be revealed in its true significance when the Japanese began pressing economic claims on the N.E.I. which amounted to an almost complete control of the country's resources (particularly oil). The Japanese government desired to introduce negotiations on this subject in Batavia by delegations under high-ranking Japanese officials accompanied by large numbers of military, naval and economic experts. As Great Britain was too fully occupied with the war elsewhere to provide adequate support against this policy, while the U.S. at that time was still neutral, the Netherlands government did not see its way clear to evade these

Japanese proposals for negotiations and decided to meet the issue squarely. By opposing reason and tenacity to the exorbitant Japanese demands, the Dutch negotiators forestalled the fulfilment of the far-reaching Japanese aims. This episode ended with a joint communiqué on June 17, 1941, which stated that both the Netherlands and the Japanese delegations "greatly regretted that the economic negotiations unfortunately had come to no satisfactory end, but that this would lead to no change in the normal relations between both countries."

From that moment events in the Pacific area moved swiftly. One day after the suspension of monetary and economic intercourse with Japan by the U.S. on July 26, 1941, the N.E.I. took the same measures; in both cases the decision was necessitated by Japanese invasion of southern Indo-China and occupation of the naval bases of Camranh Bay and Saigon. The contacts between the N.E.I. and Japan virtually ceased. By the end of November a Japanese attack in a southward direction seemed imminent; the Dutch fleet was ordered to sea, the N.E.I. army air force kept at battle-stations. When on Dec. 7, 1941, the news came of the Japanese attack on Pearl Harbor, the queen and cabinet in London at 2:30 A.M. cabled instructions to the Netherlands minister in Tokyo to inform the Japanese government, "that, as Japan has opened hostilities against two powers with whom the Netherlands maintain particularly close relations, the Netherlands consider that a state of war exists between them and Japan."

Easy Conquest.—The surrender of Indo-China and Siam offered a decisive advantage to the Japanese who, moreover, possessed an overwhelming superiority in troops, ships and material over the Allies in the South Pacific area. The lack of inter-Allied military co-ordination was remedied as far as possible by improvisation and individual decisions. Squadrons of the N.E.I. army air force were employed in the defense of Malaya and Singapore, and were thereby almost entirely lost. From Dec. 1941 until Feb. 25, 1942, a unified Allied command under Gen. Sir Archibald Wavell functioned in Java. In the actual fighting, great damage and delay to the advancing Japanese amphibious forces was caused by the N.E.I. submarines and what little remained of the air force.

After the fall of Singapore on Feb. 15, 1942, however, defeat became inevitable, but a last determined effort was made by the Allied naval forces under the command of the Dutch Vice-Admiral Karel Doorman to strike at the Japanese armada, which sailed to invade Java (battle of the Java Sea, Feb. 26–27, 1942). This cruiser squadron, which comprised U.S. and British warships as well as the remainder of the Dutch navy, was lost against overwhelming odds, and the heart of the N.E.I., Java, lay now wide open to invasion. The army there, under Lt. Gen. Hein Ter Poorten, had lost its air protection and was forced to surrender on March 7, 1942; the governor-general refused to be evacuated and was taken prisoner. In the end, therefore, the N.E.I. were temporarily lost; by their resistance however, some valuable time was gained for the Allies, and the Japanese invasion of Australia was delayed to such an extent that subsequently it had to be abandoned. (See WORLD WAR II.)

In conformity with the general war aims of Japan, the fundamental policy underlying the Japanese occupation of the N.E.I. aimed at the radical extirpation of all European cultural, administrative and economic elements; a second purpose was the organization of the country and regimen-

tation of the Indonesian peoples to aid the Japanese war effort. The first was done by the mass internment of all Europeans, men and women, in separate concentration camps. Gradually subjected to systematic starvation, they faced annihilation. For the second purpose, all political activities were concentrated in a unified Indonesian party (*Putera*), subsequently extended to embrace all Asiatic inhabitants (Chinese, Arabs, Indians), renamed *Hoekookai*, and placed under the control of a few Indonesians, who were wholehearted supporters of Japan's leadership of east Asia (among these were Ahmed Soekarno and Mohammed Hatta). Through these institutions, to which the Japanese added a para-military youth-movement (*Seinendan*) on totalitarian lines and even the "neighbourhood-associations" (*Tonarigumi*) for purposes of "thought-control," the population was subjected to systematic propaganda of racial hatred against all "white" nations (in particular the U.S. and Britain), in order to prepare them for active participation in the war by their labour, their sacrifices and by raising auxiliary military forces. Countering this propaganda, the queen of the Netherlands, broadcasting from the U.S. on the first anniversary of Pearl Harbor (Dec. 7, 1942), outlined the future policy with regard to the N.E.I., whereby the country would rank as an equal partner with Holland under the crown.

Nationalism Nurtured.—From 1943 onward the course of events showed that in the end a Japanese defeat was inevitable, and the Japanese government changed the trend of its policy in the N.E.I. accordingly; it now opened a perspective that the N.E.I. would eventually be granted a precarious "independence" as a Japanese puppet state, if the people and their leaders were prepared to throw all their weight into the war on the side of Japan. After the Japanese offer of surrender in Aug. 1945, the leaders of the Japanese-sponsored political movement in the N.E.I. headed by Soekarno were summoned by the Japanese commander in chief, southern Pacific, Field Marshal Terauchi, to his headquarters, where consultations took place concerning the setting up of an Indonesian republic, to cover the political retreat of Japan from this area after the military surrender. The Indonesians flew back to Java, and on Aug. 17, 1946, the Indonesian republic was proclaimed at Batavia, with Soekarno and Hatta acting as president and vice-president respectively. Soon afterward they picked another Indonesian, Sutan Sjahrir, who was not tainted as a collaborator, to act as prime minister.

From these events it could be foreseen that the re-establishment of constitutional authority would meet with considerable difficulties. The Netherlands, liberated in May 1945, were prostrate, their military and economic strength negligible. Military authority in the N.E.I. on Aug. 15, 1945, had been transferred from General MacArthur's Southwest Pacific command to Lord Louis Mountbatten's Southeast Asia command; and the British, who had a limited conception of their commitments in the N.E.I. (receiving the surrender of the Japanese armed forces, and the liberating of Allied prisoners of war and civilians interned by the Japanese), had insufficient forces available in this area for the fulfilment of their obligations as an occupying power in the N.E.I. to maintain law and order. When at the end of Sept. 1945 British forces began to land in Java, their commander in chief assumed a neutral attitude between the lawful N.E.I. government and the Japanese-sponsored Indonesian republic.

Insurgence.—Encouraged by these symptoms and emboldened by the wholesale transfer of Japanese armament to their military formations, the insurgent movement

spread rapidly over wide areas, its prestige enhanced by initial success and fortified by terrorism. Detailed proposals for a constitutional settlement of nationalist ambitions, made by the Netherlands government on Nov. 6, 1945, and Feb. 10, 1946, after due consultation in parliament, met with no constructive answer. Under great difficulties, fighting and bloodshed, the majority of Allied prisoners of war and internees were rescued and transferred to protected cities on the coast. Talks between the Dutch lieutenant governor-general and Indonesian leaders were initiated through the intermediary of a British ambassador (Sir Archibald Clark-Kerr, later Lord Inverchapel), but broke down on the Indonesian claim that their republic should be recognized *de jure* as a sovereign state. But soon developments took an even more dangerous course, when communist agitators from the mainland of Asia trickled into the interior and organized the beginning of a social revolution among the Indonesian masses, destitute and starving after three years of Japanese mismanagement and spoliation, and easily incited to violence and pillage. This course of events threatened even the intellectual Indonesian class, and gradually increased their willingness to come to a reasonable compromise with the Dutch.

When Dutch authority returned after the British had left the greater part of the archipelago (except some bridgeheads on the islands of Java and Sumatra), such a compromise was quickly prepared. A conference held at Malino (near Macassar) in July 1946 laid the foundations of a new political and administrative system for the archipelago (except Java and Sumatra); orderly conditions prevailed in Borneo, Celebes and the Moluccas. Sumatra, however, gradually disintegrated into a number of unconnected regions where intertribal fighting went on; in Java the republic outwardly still showed a façade of independent authority, behind which various nationalist, Islamic and communist groups manoeuvred for position. In order to expedite a compromise there also, the queen and parliament of the Netherlands sent in Sept. 1946 three commissioners-general on a mission to Batavia; they had sufficiently wide authority to come to an agreement with constructive elements within the organization of the Indonesian republic in Java. Discussions started on Oct. 7, and a truce was called to stop the irregular fighting between Allied troops and Indonesian bands.

On Nov. 15, 1946, a draft agreement was initialled at Linggadjati (near Cheribon, in west Java), by the Dutch commissioners-general and the leaders of the Indonesian republic of Java and Sumatra. According to this agreement the republic would take its place in a federation with the other islands of the archipelago. This *fédération* would bear the name of United States of Indonesia, and in its turn would enter into a union with the kingdom of the Netherlands, headed by the queen. As this agreement, which was to come into force on Jan. 1, 1949, virtually meant the end of Dutch parliamentary control over the affairs of the union and of Indonesia, opposition to it in Holland was strong. Nevertheless the Dutch cabinet gained for it the support of a substantial majority in parliament (65 votes to 30, on Dec. 20), and the commissioners-general returned to the Indies with authority to sign the agreement on behalf of the Dutch government. It remained to be seen whether the Indonesian leaders had sufficient authority to sign, and if so, to implement the Linggadjati agreement. (W. G. P.)

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Economic Consequences of the Japanese Occupation.—

During the Japanese occupation, agricultural production rapidly diminished. In 1943 the Japanese requisitioned at very low prices 25% of the harvest and in 1944 as much as 50%. Native farmers therefore were not willing to plant more food than they needed. Moreover, the Japanese forces needed large quantities of leather; they requisitioned and killed a great deal of cattle. The native farmer in Java lost the best specimens of his stock, which he needed badly for tilling the soil. Almost 4,000,000 of the farmers were forced to serve as *romushas* (slave labour) in the Japanese-occupied lands, and it was estimated that only 10% to 15% of these returned to their villages. For these reasons the Japanese occupation had disastrous results on the production of food crops in Java; rice production declined by 20%, maize by 40%.

It appeared from Japanese reports that in the residency of Batavia (6% of the total population of Java and Madura and a rice-producing area) the birth rate decreased from 2.8% to 1.5% in the period from 1942 to May 1945. In the same period the death rate increased from 1.6% to 2.8%. The yearly increase of the population of 1.2% had changed to a yearly decrease of 1.3%. The death rate of Kedu residency rose to 10%, in Soerakarta residency to as much as 11.5%. It was estimated that during the Japanese occupation 2,450,000 people died in Java from starvation and want, apart from the *romushas* who perished far from their native villages.

The Japanese furthermore wrought terrible havoc in western agricultural enterprises. About 7% of the acreage of rubber was destroyed in Java and 14% in Sumatra. More than 22% of the tea plantations in Java and 33% in Sumatra were cut. Twenty tea factories were converted into four machinery factories, two textile factories, seven factories of chemical and pharmaceutical products and explosives, one paper factory, one factory of household articles, etc. About 22% of the area under coffee and 16% of all the oil palms were destroyed, while tobacco fields were used for growing food crops. Out of 112 sugar factories in running condition, 39 were demolished and 42 were converted into: 13 factories of chemical and pharmaceutical products, 18 factories of earthenware, 8 machinery factories, 2 textile factories and 1 paper factory. The Japanese had planned the production of 200,000 tons of butanol, using sugar as raw material. This butanol was to be shipped to Japan and to be used for the production of aviation spirit. The plan completely failed because there were not sufficient tankers available.

After the reoccupation in 1946 of Celebes, Borneo, the lesser Sunda islands, Banka and Billiton and the Moluccas by Allied troops, a Netherlands Indies Rubber Fund (*Nirub*) was established in order to provide native rubber-growers with implements for tapping rubber trees and chemicals to coagulate latex. Native rubber was bought, transported, remilled, smoked, packed and sold by the *Nirub*. As soon as private businessmen were capable of taking over a job, the *Nirub* retired. All owners of rubber estates had to join the Union of Rubber growers, a section of the *Nirub* organization which provided them with implements, machinery, trucks, labour, food, etc. *Nirub* also imported inducement goods, *viz.*, rice, textile, implements, household articles etc., since native rubber growers wanted

commodities, not money. In the same way, exports of copra after the war were stimulated by the Copra fund. Coconut groves of western Borneo had been seriously neglected, and it was estimated in 1946 that it would take about two years before they were in full production again.

Smoking oil tanks and cars, fired by the Dutch as they evacuated petroleum centres in Java during the Japanese invasion of March 1942. This Japanese photograph reached the United States through Brazil



The industrialization in the N.E.I. was stimulated by the economic depression of the 1930s. In this period the trade balance soon became unfavourable for the archipelago, because prices of export products declined much more rapidly than prices of imported commodities. Native handicraft and Dutch and Chinese factories tried to produce these commodities at much cheaper prices, using native labour, paid on the Pacific wage level. The Dutch government supported these efforts by creating funds granting credits to small industries, promoting vocational education, and protecting the young industries by import duties and quotas.

(See also CURAÇAO; NETHERLANDS INDIES; SURINAM [DUTCH GUIANA]; WORLD WAR II.) (W. F. DE B.)

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Netherlands Indies (Indonesia)

The Netherlands Indies stretch 3,000 mi. from east to west and 1,300 mi. from north to south, between 6° N. and 11° S. latitude, and from 95° to 141° E. longitude. Largest island archipelago under unified rule, it includes the large islands of Sumatra, Java, Celebes, Borneo, whose north-eastern part is under British rule, and a multitude of smaller islands, together with the western half of New Guinea. The total population was estimated in 1940 at about 70,476,000, all but 2.6% of them being indigenous; 45,000,000 lived in the islands of Java and Madura, where the density of population ran as high as 1,000 inhabitants per square mile. The others were spread thinly over the vast spaces of the other islands, except on the small island of Bali, well known for the picturesqueness of its land, which was almost as densely populated as Java.

Malay is to a certain extent a language of intercommunication between different population groups speaking 25 main languages and 250 dialects. Dutch is spoken by the increasing numbers of those with a western education. Of the native population 90%, collectively called Indonesians, are of Moslem religion. The European population, about 250,000, is mostly Dutch, including some 140,000 Eurasians. Chinese constitute about 2% of the total population; 60% having been born in the Indies no longer speak Chinese, but speak Malay.

The government of the Indies, originating from a complex of small settlements and protectorates, became integrated into a single though decentralized rule for the entire territory. Before World War II a single parliament, the Volksraad, with limited powers, consisted in part of elected and in part of appointed members. The law administered by central courts was similar to that of most advanced countries, but in local affairs fullest recognition was given to the indigenous customary law.

Constitutional and administrative changes carried out a long-term policy of democratization. The powers of the Volksraad were strengthened and its composition was made more representative. In the last local elections before the war, more than 6,000,000 Javanese cast their votes. In the provinces outside Java, participation in government was much less advanced; but there, too, many local councils were elected by popular vote.

While the majority of the inhabitants still followed a simple, almost self-sufficient peasant life, part of their revenue as well as a good deal of the revenue of the territory



Revolutionary slogan lettered across a car in Surabaya, Java, shortly before the outbreak of insurrection in Oct. 1945

as a whole was derived largely from export of raw materials mainly of agricultural origin. As industry was only in its infancy, the proceeds of this export served to pay for a long list of import-needs. During the booming years of the 1920s nothing in this situation had seemed unwholesome. A substantial percentage of the world's export of a long list of raw materials came from the Indies. However, the economic depression at the beginning of the 1930s had brought to full realization the Indies' precarious dependence on world markets for their principal products. The index figures for wholesale prices of goods exported between 1929 and 1936 declined from 100 to 32, that of goods imported only to 47.

To remedy the ill-effects of this situation, a new economic policy was set up, based largely on making the Indies self-sufficient in its need of rice, the main food, and on industrialization in order to make the country less-dependent on import needs. Participation in international production regulations like those set up for rubber, tin, sugar, helped to offset in a way the ill-effects of over-production. Furthermore, it proved necessary to control the imports in order to reserve the profitable import trade principally for those countries which were customers of the Indies' export products.

Recovery, however, was difficult and slow. At last, in the beginning of the decade 1937-46, it seemed that the worst was over. The new economic policy started to bear fruit.

Japan's Economic Aggression.—The Japanese demands of 1934 to attain preferential treatment in the Indies had been rejected. A strong Japanese trade delegation had come to Batavia for this purpose, but the Netherlands Indies government stuck to its contention that the benefit of the country's resources and trade should go first to its citizens and second to its regular customers, among whom the U.S. and Great Britain were foremost. Between 1929 and 1935, Japan's share in the Indies' imports had grown from 11% to 30%, whereas Japan did not take more than 5% of the island's exports.

A second Japanese attempt to dominate the country economically came in 1940, when the Netherlands were overrun by the Germans. Another large trade delegation to Batavia expected to find a society disconsolately cut off from its home country and desirous to find a new sponsor and protector. It found a self-conscious and prosperous country, never before so united, and determined to reject Japanese demands of preferential treatment, the more so since such preferential treatment at that time would have meant strengthening of the axis, with which Japan was already siding. The attitude of the U.S. not to tolerate changes in the status quo backed the Indies stand. Huge supplies of rubber, tin, quinine and vegetable oils went to the Allies. Japan did not get more than was needed for its domestic use in order to prevent surplus supplies from being sent to Germany via the trans-Siberian railway.

Preparation for War.—By the end of 1940 there was no longer any question as to the Japanese empire's intentions. Through its forced allies, Thailand (Siam) and Indo-

China, Japan was securing large supplies of food and war materials. It created naval bases that could be used only for a premeditated attack on the rest of southeast Asia. Another Japanese trade mission to Batavia returned in June 1941, defeated by the determination of the Indies government to do nothing that would strengthen the axis, even though this meant imminent danger to its own security. War was in the air.

All but 2,000 of the Japanese "merchants" who had flocked to the islands went home.

The Netherlands Indies government before and after the outbreak of war in Europe had done everything possible to strengthen its military, naval and air forces. Military draft existed for the citizens of Netherlands origin; in 1940, military draft was also introduced for all the other citizens.

However, armament was hard to get even for countries like the Indies which could pay with gold.

Quick Conquest.—Within a few hours of the attack on Pearl Harbor and Singapore, the Netherlands government in London declared war on Japan, even before formal declarations of war were issued by the U.S. and Great Britain. Netherlands submarines were out far to the north of the Indies in the South China sea and in the Gulf of Siam, and they accounted for many Japanese transports. General Sir Archibald Wavell had established headquarters in Java and had assumed over-all command of Allied military, naval and air forces in southeast Asia.

However, a series of adversities turned the campaign in southeast Asia into a calamity for the Allies and into a continuous victory for the Japanese. With the U.S. fleet crippled at Pearl Harbor, the U.S. air forces in the Philippines practically destroyed and two British battle cruisers destroyed off Singapore, the Allied ground forces, fighting with insufficient or without air cover, had to cope at every meeting point with stronger Japanese units concentrated at will, thanks to sea and air supremacy. So Manila and Singapore fell, and the Japanese then concentrated on the Indies. At that time the Dutch air forces had already sustained heavy damage in the defense of Singapore, where the British had called them in for assistance.

The Japanese penetrated into the Indies in a many-pronged amphibious attack, taking Tarakan and Balikpapan on the island of Borneo and, after the surrender of Singapore, also Palembang on the island of Sumatra, all of them important oil ports. The oil installations, however, were systematically destroyed by the Dutch. The combined sea strength of the Allies in the area was placed under the command of the Netherlands Rear-Admiral K. W. F. Doorman. This combined squadron inflicted heavy losses on the Japanese fleet in the battle of the Java sea—a series of shifts between open fighting and strategic retreat. Admiral Doorman made a last, desperate foray against the invasion fleet off Java's north coast. Inflicting heavy damages upon the Japanese, the Allied fleet succumbed, leaving Java open to a landing, which subsequently was made with overwhelming forces on three places along Java's long northern shore.

On March 8, 1942, Java surrendered. However, a scorched-earth policy here and elsewhere in the Indies prevented the Japanese from reaping instant military benefits for further conquests.

Road Back.—The governor-general of the Indies, A. W. L. Tjarda van Starkenborgh Stachouwer, stayed with the men he commanded and was interned with them. But before the surrender of Java he had sent Lieutenant Gov-

ernor-General Hubertus J. van Mook out of the Indies to organize the campaign to reconquer the territory. Van Mook set up headquarters in Australia; the only part of the Indies escaping occupation by the Japanese was the southern part of Netherlands New Guinea, with Merauke as its centre, near Australia.

The way back to Java proved to be long and difficult. On April 29, 1944, fully two years after the surrender of Java, General MacArthur's forces, seconded by Netherlands Indies military and civil units, secured their first foothold on Japanese occupied Netherlands Indies soil, at Hollandia on Netherlands New Guinea's north shore. After the liberation of the Philippines, Tarakan was retaken from the Japanese. After the surrender of the Japanese empire on Aug. 15, 1945, the Netherlands in Europe could not participate in a substantial way in the liberation of the Indies. They had been liberated themselves only since May 1945, and they were in a condition of extreme starvation. The liberation of the Indies was originally MacArthur's task, and he had plans and forces ready. But at the last moment it was shifted to Britain's Mountbatten, who did not have forces at hand. It was not until Oct. 1945, fully two months after the Japanese surrender, that the British moved in with a single division, an inadequate force to meet a situation which had grown entirely out of hand. To understand the political and military sides of this situation it is necessary to look back first at the political situation before and during the Japanese occupation of the Indies.

Dutch Political Reforms.—In the 1930s, a nationalist movement, born in 1910, after having strived for immediate independence, gradually channelled itself into co-

Sutomo, Indonesian extremist leader in eastern Java, emphasizing a point during an address at his headquarters in Mojokerto, Java



operation with the Dutch on the basis of a commonwealth with equality between Dutch and Indonesians. This conciliation was brought out unmistakably by an all-out investigation of the wishes of the different groups and parties in the Indies, set up to prepare political reforms, and finished just before the Japanese invasion. The report of this commission was named for its chairman, Visman.

During World War II, the Netherlands government in London understood that Netherlands Indies rule could return to the islands only on the basis of a newly declared policy. Queen Wilhelmina made a declaration of this policy on the first anniversary of the Pearl Harbor attack, in Dec. 1942. Her declaration recognized that a lasting co-operation between the Indies and the Netherlands should be established on a voluntary basis; to this end it offered an equal partnership in a commonwealth, with full autonomy for each constituting part in its noncommunal affairs. However, the declaration did not reach the Indonesians on account of the Japanese news blackout; other circumstances prevented the declaration from fructifying.

Political Results of the Japanese Occupation.—It was only natural that Japanese victory over Allied forces in southeast Asia should make a deep impression on the native population, an impression which became more deeply imbedded when Japanese occupation was accompanied by internment, ill-treatment and humiliation of the white peoples, men, women and children. Japanese propaganda not only geared the conquered countries to the Japanese war-effort; it also aimed at alienating the native peoples from their former metropolitan countries. A rigid regimentation covering all aspects of social, economic and cultural native life served both purposes. Whereas all existing political associations were disbanded, adhesion to a Japanese-led Asiatic co-prosperity sphere was promoted. Realization of this plan would have meant making friends of the Indonesian peoples. But already Japan's need for the strategic raw materials and the manpower of the Indies was so great that every political object had to be subordinated to the object of maximum production, and this could be achieved only under compulsion. Toward the end of the occupation, looting as well as inefficiency resulted in a serious lessening of production capacity. Millions of people were close to starvation.

The lack of purchasable goods produced serious inflation. By lowering wage rates and introducing compulsory saving, the Japanese hoped to arrest inflation and secure a cheap labour supply without seeming to enslave the people. Thousands upon thousands of Javanese were deported as construction gangs, the starved and depleted remnants of which were found by victorious Allied armies in New Guinea and elsewhere. As a result, there was little love for the Japanese. These conditions made a breeding ground for revolt, as the Japanese themselves had experienced to some extent during the occupation, and as the returning Allies were to experience later on a grand scale.

The Japanese continued their anti-white and anti-Netherlands propaganda uninterrupted for three years. They brought native leaders to the fore instead of the former traditional chiefs. Thousands upon thousands of young men were regimented and indoctrinated in civilian organizations and later in military organizations. In a country where everything from food to clothes was getting scarce, these men were well provided for if, with the material aid, they swallowed the political food of Japanese origin.

After the Japanese had suffered their first reverses in the Pacific war, they started to dangle independence before the eyes of the Indonesians. A few days before their

surrender the Japanese precipitated the establishment of the republic of Indonesia. This became a fact on Aug. 17, 1945, two days after the Japanese surrender. Soekarno, a graduate of an engineering college in the Indies, later a nationalist leader and orator, who often clashed with the Dutch, became its self-styled president and Mohammed Hatta its self-styled vice-president.

Republic of Indonesia.—The republic of Indonesia came into being in a vacuum of authority. The British could not be on the spot in time and in force; the Japanese, dispirited and disposed to make things difficult for the returning western powers, surrendered arms to the Indonesians. The Dutch government and Dutch forces returning from headquarters in Australia were hampered by a communist Australian waterfront strike against Dutch ships.

From the outset the republic of Indonesia enjoyed also the support of Indonesians who had not collaborated with the Japanese. The republic was nonetheless plagued with factional strife and terrorist gangs. Central authority, if present at all, was weak in the beginning. However, the Allied (British and Netherlands) occupational forces were also weak. Victims of this situation were the former prisoners of war and internees, men and women and children, whose camps were continually attacked by bands of terrorists.

Gradually, after a time, and at the expense of much fighting, safety zones were established in and around the large cities in Java. In Nov. 1946, more than a year after the Japanese surrender, the last of the men, women and children interned by the Japanese were brought to these zones, but even then thousands of Eurasians, put into camps by the nationalists, were still in their hands.

The Dutch and the Indonesians.—The Dutch were successful in re-establishing their authority in Borneo and in all the islands east of Borneo and Java.

When fresh troops arrived from the Netherlands they took over the military job of the British in the four cities of Java and in a few places in Sumatra. On Nov. 30, 1946, military command in the Indies was transferred from the British to the Dutch.

The republic Indonesia more or less consolidated itself. Negotiations between the Dutch and the Indonesians had been carried on for some time in order to establish a basis of political understanding. To the fore came Van Mook on the Dutch side, Soetan Sjahrir as prime minister on the republican side, and Lord Inverchapel, British ambassador, as representative of the military power endowed with military command on behalf of the Allies. The home government in the Netherlands, in order to stimulate these negotiations, dispatched a commission general of three men: W. Schermerhorn, former prime minister of the Netherlands, M. J. M. van Poll, a member of the Netherlands states-general, and F. de Boer, a former shipping director and mayor of Amsterdam. By this time Lord Inverchapel was replaced by Lord Killearn. The mission resulted in a truce between Netherlands and Indonesian forces, followed on Nov. 15, 1946, by a political agreement, signed at Linggadjati, a mountain resort near Cheribon, Java.

The agreement included a *de facto* recognition of the republic of Indonesia as a sovereign state as far as the islands of Java and Sumatra were concerned. The republic, together with the states to be formed in an equal position in Borneo, and in the islands east of Borneo and Java, were to be a commonwealth under the name of the United States of Indonesia. This commonwealth was to



Young Indonesians, armed with sharpened bamboo poles, on parade at a nationalist rally in Java late in 1945

enter into a union with the Netherlands (and the Netherlands West Indies) under the Netherlands crown. In Dec. 1946 the Netherlands parliament, after stiff opposition of a minority, approved the outline of these reforms.

Netherlands East Indies: Statistical Data, 1938

Item	Value (000's omitted)	Amount or Number
Exchange rate		
United States		1 Florin = 55c
Great Britain		8.56 to 8.59 Florins = £1
Finance		
Government revenues	\$328,212 (£67,133)	
Government expenditures . .	\$357,028 (£73,027)	
Gold reserves	\$64,361 (£13,164)	
National debt	\$752,527 (£153,922)	
Transportation		
Railroads		4,473 mi.
Highways		41,959 "
Waterways (rivers)		1,090 "
Communication		
Telephones		45,033
Telegraph lines		4,662 mi.
Radio sets		70,909
Crops		
Rice		6,898,095 tons
Corn		2,122,988 "
Sugar		1,516,225 "
Livestock		
Cattle		4,463,439
Carabaos		3,199,944
Horses		693,594
Minerals		
Petroleum		8,154,566 tons
Tin		28,148 "
Gold		83,716 oz.
Bauxite		270,454 tons
Forest products		
Cinchona		12,076 "
Teakwood		6,286,029 cu.ft.
Wood (miscellaneous)		4,131,828 "
Exports—total	\$361,846 (£74,012)	12,090,000 tons
Petroleum and petroleum products	\$90,225 (£18,455)	7,093,000 "
Rubber	\$74,475 (£15,233)	365,000 "
Vegetable oils and fats	\$36,132 (£7,390)	1,012,000 "
Tea	\$30,939 (£6,328)	90,000 "
Imports—total	\$263,191 (£53,833)	2,202,000 "
Thread, cordage, clothing, etc.	\$66,367 (£13,575)	161,000 "
Food	\$48,823 (£9,986)	687,000 "
Machinery, tools and apparatus	\$36,621 (£7,490)	82,000 "
Metals (except silver and gold)	\$32,017 (£6,549)	302,000 "
Defense		
Standing army personnel . . .		36,889*
Reserves		32,642*
Standing navy personnel . . .		5,791*
Education		
Schools of all types		21,440*
Students		2,324,505*
Teachers		49,622*

*1939.

(See also JAPAN; NETHERLANDS COLONIAL EMPIRE.)

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Netherlands New Guinea

See NETHERLANDS COLONIAL EMPIRE; NETHERLANDS INDIES; NEW GUINEA.

Neurath, Constantin von

Count von Neurath (1873–), German statesman, was born on Feb. 2, 1873, in Wuerttemberg and was educated at the law faculties of Tuebingen and Berlin universities. After serving in diplomatic posts in London from 1903 to 1907 and in Istanbul from 1914 to 1916, he was minister to Denmark in 1919, ambassador to Italy in 1921, and ambassador to Great Britain from 1930 to 1932. Appointed foreign minister of the reich in 1932, Neurath retained this post under Franz von Papen, Kurt von Schleicher and Hitler. In Feb. 1938 he was ousted by Hitler in favour of his nazi associate, Joachim von Ribbentrop. Neurath was appointed Reichsprotector for Bohemia-Moravia in March 1939, but as he was considered too lenient in his treatment of the Czechs, he was formally

declared "on leave of absence" in Sept. 1941, and the actual administration of the protectorate was transferred to Reinhard Heydrich. Captured by French troops after the defeat of Germany in World War II, Neurath was indicted as a major war criminal. In Oct. 1946 he was sentenced by the Nuernberg tribunal to 15 years' imprisonment.

Neutrality

See INTERNATIONAL LAW.

Neutrino

See PHYSICS.

Neutron

See ATOMIC BOMB; CHEMISTRY; PHYSICS.

Nevada

One of the mountain group in western United States, Nevada, popularly called the "Sagebrush" or "Silver" state, entered the union as the 36th state on Oct. 31, 1864. Area 110,540 sq.mi. with 738 sq.mi. of water. Population (1940) 110,247, of which 66,956 were rural and 43,291 were urban; 93,431 were native white and 10,599 were foreign-born white; 664 were Negro and 5,553 were of other races. Capital, Carson City (2,478); other cities: Reno (21,317); Las Vegas (8,422); Sparks (5,318); Ely (4,140); Elko (4,094). On July 1, 1944, the bureau of census estimated the population at 156,445.

The principal state officials in 1937 were: governor, Richard Kirman; lieutenant governor, Fred Alward; secretary of state, Malcolm McEachin; attorney general, Gray Mashburn.

In 1938 E. P. Carville was elected governor, and Maurice J. Sullivan lieutenant governor. Other principal state officers elected were: secretary of state, Malcolm McEachin; attorney general, Gray Mashburn; treasurer, Dan Franks; controller, Henry Schmidt; surveyor general, E. W. McLeod; mine inspector, Matt Murphy.

In 1939, Nevada held its Diamond Jubilee celebration at Carson City on Oct. 29, 30 and 31, marking its 75th year of statehood. Legislation passed in this and the immediately preceding years included a workmen's compensation law, child labour laws, a women's minimum wage law and a law to permit open gambling under state licence. Nevada had made no material changes in its tax laws, except the gasoline tax, in 30 years.

The Democratic vote for Franklin D. Roosevelt in the 1940 presidential election was 31,945, the total vote for Wendell L. Willkie, Republican nominee, was 21,229. Outstanding events of the year 1940 were the election on Nov. 5, closely followed by the death of Key Pittman, for 26 years U.S. senator for Nevada. Pittman, again elected for a six-year term, died in Reno on Nov. 10, after a brief illness.

The electorate in 1940 approved an amendment to the state constitution whereby all licence fees and gasoline tax fees paid by motor vehicles were to be expended for public highway work in Nevada.

A second amendment denied the state legislature the power to abolish any county in the state unless the voters of the county affected should first approve such abolishment.

In 1941, the appointment by Governor Carville of a director of the state council of defense resulted in Nevada's having an efficient operating council months in advance of U.S. entry into the war. The council was financed by an emergency appropriation of \$10,000 passed

by the legislature.

Nevada in 1942 geared itself to war. The naval project at Hawthorne, the Reno air base at Lemmon Valley and the \$100,000,000 magnesium plant at Las Vegas caused great activity and increase in population. A curtailment in precious metal mining caused a serious setback in many sections. The Democratic party made a clean sweep in the general election of Nov. 3, re-electing E. P. Carville governor; other officials elected were: lieutenant governor, Vail Pittman; secretary of state, Malcolm McEachin; attorney general, Alan H. Bible; treasurer, Dan W. Franks; controller, Henry C. Schmidt; superintendent of public instruction, Mildred Bray; U.S. senators, Pat McCarran and J. G. Scrugham; representative in congress, Maurice J. Sullivan; chief justice, William E. Orr.

The 41st session of the legislature in 1943 was featured by legislation retiring all outstanding bonds and the creation of \$1,000,000 postwar fund. Other acts passed by the legislature included the following: the Flight Strip act, authorizing the department of highways to co-operate with the Public Roads administration of the U.S. in the construction and maintenance of flight strips and of certain classes of highways; the Nevada State Police act, which provided for the creation and organization of a state police consisting of 1 inspector, 3 sergeants, 5 subordinate police officers and 250 reserves.

The creation of a postwar fund by the legislature placed the state in a favourable position to aid the returning service men, and Nevada's postwar program and formation of working economic conferences set a pattern which other states copied. The postwar fund reached the total of \$1,510,138 in cash and bond balances; this fund was in addition to the cash balance of \$3,820,197 in the general fund, which also would aid in financing the postwar program, giving service men and women employment on their return to civilian life.

In the presidential election of 1944, Franklin D. Roosevelt received 29,623 votes and Thomas E. Dewey 24,611.

The 1945 session of the state legislature passed many important laws; outstanding was the legislation imposing a gross business tax of 1% on gambling. This levy created widespread interest throughout Nevada and resulted in collections, during the period July 1, 1945, to Dec. 31, 1945, of \$98,066. Many bills were approved increasing the salaries of elective, appointive and general employees of the state; salary increases averaged 15%. Legislation completely reorganizing the governing board of the state hospital for mental diseases was passed and resulted in improved conditions at the hospital.

During 1945, important changes occurred in the political setup in the state. First in order of importance was the death of U.S. Senator James G. Scrugham, on June 23; this was followed by the resignation of Governor E. P. Carville on July 24, Lieutenant Governor Vail Pittman being elevated to the position of governor. Pittman later appointed E. P. Carville as junior U.S. senator. Other appointments were: Gilbert C. Ross to succeed Albert L. McGinty, who resigned as director of the state employment security department; Charles Lee Horsey as supreme court justice to succeed William E. Orr, who was named to the U.S. circuit court of appeals; Roger Foley to succeed federal judge Frank H. Norcross, who retired. In Jan. 1946, state officers were: governor, Vail Pittman; lieutenant governor, vacant; secretary of state, Malcolm McEachin; controller, Henry C. Schmidt; superintendent of

public instruction, Mildred Bray; chief justice of the supreme court, E. J. L. Taber.

The 1946 general election was marked by a political upheaval in Nevada despite an almost two to one Democratic registration. The voters elected Republican George W. Malone to the United States senate and Charles H. Russell as representative in congress. Vail Pittman, Democrat, however, who had been acting governor from July 24, 1945, was elected governor by a large majority, carrying with him the entire Democratic state slate of officials, as follows:

Lieutenant governor, Clifford Jones; secretary of state, John Koontz; state controller, J. P. Donovan; state treasurer, Dan W. Franks; superintendent of public instruction, Mildred Bray; attorney general, Alan H. Bible; chief justice of the supreme court, Edgar Eather; justices, Charles Lee Horsey and E. J. L. Taber.

Nevada: Statistical Data
Table I.—Education (Public)

	1938	1941	1942	1943	1945	1946
Elementary school pupils . . .	15,066	14,853	19,432	19,367	17,420	17,604
High school pupils . . .	5,286	5,911	6,277	6,237	5,667	5,510
Elementary school teachers . . .	576	669	701	696	651	602
High school teachers . . .	281	259	298	299	241	237

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Cases on general relief	751	696	553	791	426
Cost of general relief	\$11	\$9	\$8	\$9	\$7
Recipients of old-age pensions		2,099		2,272	2,317
Cost of old-age pensions		\$56		\$60	\$62
Dependent children receiving aid		303		230	262
Workers under unemployment compensation		22,885	22,924	24,400	

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1941	1943	1945
Highway mileage		5,103	5,192	5,521	5,518	5,641
Expenditure on highways	\$5,163	\$4,143	\$4,064	\$4,509	\$4,412	
Railroad mileage	2,115	1,935	1,932		1,830	1,819

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
State revenue	\$7,368	\$8,867	\$9,647	\$8,083	\$10,460	\$11,263
State expenditure	\$3,578	\$4,627	\$9,684	\$6,935	\$6,464	\$6,844
Number of banks	11	11				
Number of natl. banks	5	6	7	6		5
Deposits of natl. banks	\$32,062	\$37,776	\$41,153			

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1943	1944	1945 (est.)
Income from crops and livestock . . .	\$13,300	\$12,821	\$13,680				
Leading crops (bu.)							
Barley	304	525	540	828	984	781	640
Corn	60	120	120		112	64	64
Hay (tons)	376	338	382	636	603	611	599
Oats	105	245	280	320	320	284	273
Potatoes	345	280	391	403	585	587	780
Wheat	484	412	483	484	548	440	388

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
Wage earners				1,012	1,093	1,093
Wages paid				\$1,625	\$1,642	\$1,000
Value of products				\$20,568	\$20,582	\$20,582

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
Total value mineral production . . .	\$38,872	\$34,671	\$38,873	\$27,770	\$27,372	\$24,326
Leading products (value):						
Copper	18,054	13,852	18,442	18,083	16,533	14,273
Gold	9,847	12,653	13,031	4,830	4,167	3,553
Silver	3,763	2,930	4,114	1,106	896	705
Zinc	1,851	648	2,224	3,043	4,719	4,669
Lead	1,103	398	1,063	708	1,057	1,127

Further changes occurred in the state's political set-up during 1946: Supreme Court Justice Edward A. Ducker died on Aug. 15; Judge Edgar Eather was appointed by Governor Vail Pittman on Sept. 6, to fill the vacancy; thus, for the first time all three members of the state supreme court faced the voters in the general election.

(E. C. D. M.)

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New Brunswick

One of the original four provinces of Canadian confederation in 1867, New Brunswick is a compact geographical unit of 27,985 sq.mi., of which only 512 sq.mi. are fresh-water lakes. Almost three-quarters surrounded by arms of the Atlantic ocean, the province is bounded on the north by Quebec and the Bay of Chaleur; on the east by the Gulf of St. Lawrence, the Strait of Northumberland and the narrow Chignecto isthmus through which runs the western extremity of Nova Scotia; on the south by the Bays of Fundy and Passamaquoddy and on the west by the state of Maine and the province of Quebec.

Though between 1911 and 1921 the cities grew faster than the country areas, the 68% rural composition remained steady from 1931 on. The figures were: (1931) 408,255; (1941) 457,401; (1946 estimate of the dominion bureau of statistics) 468,000. Although Fredericton (10,062) is the capital, Saint John (51,741) and Moncton (22,763) are larger centres.

In 1941, about two-thirds of the population were of British stock, one-third of French and one-tenth Dutch. A few other even smaller racial groups were recognized. Largest religious denomination was Roman Catholic, numbering almost half the population; the Baptist Church was next and close behind, the United Church of Canada and the Church of England.

There were about half a score other smaller religious denominations.

Lieutenant-governors during the 1937-46 decade were Col. Murray MacLaren (Feb. 8, 1935-March 12, 1940) and William G. Clarke (after March 12, 1940). Premiers were A. Allison Dysart (July 16, 1935-March 13, 1940) and J. B. McNair (after March 13, 1940).

* * *

"STABILITY and modest expansion" best described New Brunswick's political and economic history during the 1937-46 decade. Under Conservative policies from 1925-35, the electorate shifted to Liberal policies in 1935 and continued to support the Liberals by a wide margin in the 1939 and 1944 elections.

Both the Dysart and McNair regimes strove for a balanced economy; and, eager to capitalize on postwar opportunities, the McNair government in 1944 created three organizations to offer recommendations. The Committee on Reconstruction proposed a long-term development of existing primary industries and creation of secondary industries. The Natural Resources Development board investigated particularly the forest resources. A new department of industry and reconstruction took up the recommendations of the board and urged manufacturers to add new lines to those already being produced, including exploitation of vast peat bogs and high-quality marble deposits.

As suggested, most of New Brunswick's manufacturies

were still confined to processing raw materials from farm, forest and sea. Thus, by its very nature, New Brunswick's industry did not enjoy the World War II prosperity of more highly industrialized Ontario. And, conversely, when the war ended it did not have sharp reconversion problems.

Nevertheless, within the capacities of the province's industrial structure, it made a notable war contribution and benefited thereby.

There was a modest growth in capital plant and employee pay rolls in the province, and the value of manufactured goods expanded from \$69,500,000 in 1937 to \$141,000,000 in 1943.

With forested areas its largest single resource, New Brunswick's 1937-46 industrial stability came from that raw material.

Thus, it was natural that the government's postwar economic program was so largely in terms of forestry management and conservation. With the close of the war, the lands and mines department built more forest roads, erected more lookout towers, installed more telephone and radio communication and improved rivers for log drive purposes.

In 1946 it opened a ranger school at the University of New Brunswick.

Stimulated by the war, agriculture, next largest primary economic division after forestry, reached unprecedented production levels toward the end of the 1937-46 decade. Farm capital investment increased by more than 10% while gross value of farm production went up about 140%. Hoping to extend this agriculture buoyancy into the post-war years, the government aided in the construction of creameries.

With its very extensive coast line, and possessing the largest smelt fishery in North America and the largest sardine cannery in the British empire, it was surprising that during the 1937-46 decade only about 5% of New Brunswick's production was from fishing. One of the first acts of the industry and reconstruction department was the creation of a fisheries division which in turn set up a Fisherman's Loan board backed by a fund of \$150,000 from which fishermen borrowed money to modernize equipment.

The modest industrial expansion in New Brunswick also created a modest expansion in electric energy consumption, bringing realization that the future of the province depended on adequate cheap electric power. In 1946 the government made a start on a \$10,000,000 hydroelectric development program. Use of tidal power, however, got no further than the experimental stages.

During the early part of the 1937-46 decade, New Brunswick was only partially aware of the value of its tourist trade. The unexpected rush of tourists during the first full postwar season of 1946 brought out its potentials, and the government began a \$10,000,000 road-improvement program to help increase the province's attraction for outsiders.

Transportation facilities developed during the decade. In 1939 Shediac became a port of call for the first trans-Atlantic mail route, and Moncton became a depot of the Trans-Canada airlines coast-to-coast service. During the war, Saint John was one of the major bases of the "bridge of ships" across the submarine-infested Atlantic. In 1946 the Canadian Pacific steamship "Princess" plying across the Bay of Fundy between Saint John and Digby, installed radar, the first Canadian commercial vessel to use this war-born miracle. In 1945 the Canadian Broadcasting corporation opened its 19-metre band short-wave station at Sackville, the strongest North American station at the time of its opening.

Although New Brunswick's share of the national income during the 1937-46 decade grew from \$233 to \$500 per capita, Canadians in all the other provinces used more radios, and in all the other provinces but one used more telephones and cars. Nevertheless, neither the provincial government nor any of the municipal governments failed to meet full financial obligations. (C. Cy.)

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New Brunswick: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain . . .		4.867 Canadian \$ = £1		4.45 Canadian \$ = £1		4.45 Canadian \$ = £1
United States . . .		1 Canadian \$ = 99.4 cents		1 Canadian \$ = 90.9 cents		1 Canadian \$ = 90.9 cents
Finance						
Provincial revenues	£2,146 (\$10,491)		£3,101 (\$12,502)		£2,759 (\$11,132)*	
Provincial expenditures . . .	£2,134 (\$10,431)		£2,898 (\$11,683)		£3,582 (\$14,455)*	
Transportation						
Railroads		1,872 mi.		1,836 mi.		1,835 mi.
Highways		12,022 "		12,295 "		12,312 "
Communication						
Telephones		33,043		38,863		43,751
Telegraph lines . .						2,186 mi.†
Radio sets		29,956		41,758		53,240†
Minerals						
Sand and gravel . .		3,833,540 tons		944,033 tons†		1,960,382 tons
Coal		342,238 "		523,344 tons		345,123 "
Natural gas		577,492,000 cu.ft.		616,041,000 cu.ft.†		1,845,277,000 cu.ft.
Gypsum		48,418 tons		56,172 tons		42,040 tons
Stone		13,279 "		166,153 " †		69,988 "
Crops						
Hay and clover . .		904,000 tons		818,000 tons		1,050,000 tons†
Potatoes		228,000 "		321,000 "		378,000 " †
Turnips		143,000 "		147,000 "		133,000 " †
Oats		100,000 "		99,000 "		93,000 " †
Livestock						
Cattle		217,000		207,000		226,000†
Sheep		110,000		93,000		114,000†
Swine		82,000		68,000		82,000†
Horses		52,000		45,000		46,000†
Manufactures						
Total	£14,053 (\$69,479)§	...	£14,302 (\$63,429)¶	...	£31,750 (\$128,110)¶	...
Pulp and paper . .	£4,085 (\$20,195)§	...	£3,384 (\$15,009)¶	...	£6,978 (\$28,158)¶	...
Sawmills	£1,534 (\$7,585)§	...	£1,218 (\$5,402)¶	...	£3,553 (\$14,335)¶	...
Coffee, tea and spices	£726 (\$3,589)§	...	£901 (\$3,997)¶	...	Not listed	...
Fish processing . .	£630 (\$3,115)§	...	£751 (\$3,331)¶	...	£1,797 (\$7,249)¶	...
Shipbuilding and repairs . . . . .	||	||	||	||	£1,828 (\$7,376)¶	...
Education Enrolment						
Provincial schools .		93,065		97,188		92,719
Private schools . .		3,290		3,264		3,979
Dominion Indian schools		337		319		318
Universities and colleges		2,116		2,117		2,608

*Provisional figures. †1945. ‡1940. §1937. ||No separate figures. ¶1939. ¶1943.

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See FRENCH COLONIAL EMPIRE; PACIFIC ISLANDS, FRENCH.

New Deal

Practically every important political manoeuvre and speech of the 1946 congressional campaign in the U.S. took it for granted that there had been a New Deal. Republicans generally regarded the New Deal as something to be modified but not entirely abandoned: certain "social gains" should be kept, but the budget should be balanced, taxes should be lowered, the Wagner act should be altered to permit industry to have its say in the collective bargaining arena and there should be less planning and more freedom of enterprise. Only in the realm of foreign policy did the Republicans defer to the Democrats—the bipartisan approach should be continued here. But the "firmness toward Russia" tone of bipartisanship was as much Republican as Democratic—indeed, the Henry Wallace-Claude Pepper Democrats were not convinced that Secretary of State James F. Byrnes was carrying out the "Roosevelt policy" at all.

If the New Deal is properly to be deduced from the number of things which the Republicans swore to modify, it may be said to have consisted of public spending, high taxes, favouritism to labour and excessive government interference in business and production. But this is to judge the New Deal on the plane of sentiments and events, not ultimate philosophy. The attempt to pin down the philosophy of the New Deal is far more difficult than any recital of campaign promises or negations would lead one to believe. For the New Deal was not one New Deal but many New Deals. At its head and fount was an enigmatic and contradictory personality: Franklin D. Roosevelt, four-time president of the United States. Rooseveltians who swore by their leader often swore vindictively at each other, and always in the name of the New Deal. A pragmatic man who knew how to build up personal power on a balance of opposites, Roosevelt encouraged the conflicts that went on about him and below him. He found it useful to have many points of view on tap. Inasmuch as the party he had to manage was a loosely-knit congeries of dissident groups, regional blocs and personalities, it was convenient to have something or someone on hand to please everybody. A man with a nicely articulated economic philosophy could never have kept a firm rein on southern cotton growers and Harlem Negroes, Georgia Baptists and Boston Irish Catholics, Pittsburgh steelworkers and California walnut ranchers, young intellectuals from the law schools and anti-intellectuals from the piney woods of Mississippi. But Roosevelt, a pragmatic, eupeptic man with a pleasant personality, an ability to sleep well of nights and a willingness to try anything once, actually did manage to hold his heterogeneous following together for a little more than 12 years.

Business, the Whipping Boy.—How did he do it? The mystery is more or less explained by isolating the dominant sentiment of the 1930s, which was distrust of the business community. True, Roosevelt deferred to business leadership after the war crisis had grown to sizable proportions. But that was after "Dr. New Deal" had been dismissed "for the duration" in favour of "Dr. Win-the-War." A few of the Roosevelt followers denounced this as shameful surrender to "reaction." But most of them went along with the boss for the obvious reason that war production

depended on co-operation with the top production men. When it was all over, they argued, "Dr. New Deal" would take over once more.

The early New Deal crusade was dedicated to driving "the money changers" out of the temple. Since practically everybody resented the grueling aftermath of the 1929 Wall street crash, it was easy to unite the owner of a mortgaged farm, the unemployed city worker, the bankrupted small-business man, the young lawyer without a future and the college president without a source of new endowment funds on a basic platform of enmity toward the business overlords of the 1920s. The business men had let their system get out of hand; let them take the consequences. But enmity is a feeling, a sentiment, not a philosophy. When it came to building a program of action on the ground-level of sentiment, the philosophers of the New Deal found themselves rearing a tower of Babel.

Antitheses.—To understand what came after 1937 in the New Deal, one must review the trend of the first Rooseveltian term. The original Roosevelt "Brain Trust" included many proponents of the new creed of "planning." There was Rexford Guy Tugwell, a Columbia university professor who believed in integrating the industrial system along corporate lines, with a complex series of interrelated controls over prices, wages, hours-of-work and new investments. There was Raymond Moley, another Columbia university man who drew the logical conclusion that Tugwellian planning meant "control of the border"—i.e., economic nationalism. (One can hardly hope to regulate an internal price level without regulating imports and exports and the impact of foreign currencies on one's own.) The Moley-Tugwell group, however, had to fight it out with Secretary of State Cordell Hull, an old-fashioned Free Trader, and with Democrats who believed in the enforcement of the antitrust acts and the removal of barriers to competition. With the jettisoning of the London Economic conference and the passage of the National Industrial Recovery act, it was apparent that Tugwellian "planning" had won; the U.S. industrial machine was henceforward to be run under a series of codes, with competition and new investment kept within certain bounds, and with labour getting its share of the fruits of "planning" in the form of a guaranteed minimum. The unemployed were to be taken care of by PWA (Public Works authority) and by WPA (the Works Progress administration). As for the farmer, AAA (Agricultural Adjustment administration) crop limitations and bounties for co-operating in certain soil conservation practices were to underwrite him.

The National Recovery administration, which was set up under the terms of the National Industrial Recovery act, had to depend on voluntary compliance, inasmuch as its boss, Gen. Hugh ("Iron Pants") Johnson, had no budget for an industrial police force. And voluntary compliance wasn't enough: the NRA Blue Eagle was a dead bird even before the supreme court decision in the Schechter case effectively outlawed NRA-ism. The National Industrial Recovery act, however, was to have its permanent effect on the philosophy of the New Deal, for under its famous section 7A, which guaranteed labour the right to organize for collective bargaining, John L. Lewis rebuilt his moribund United Mine Workers into an instrument of great power. By the time a second Rooseveltian term had rolled around, the C.I.O. had split off from the A.F. of L. and was ready to do its bargaining business in the mass production industries, with Lewis acting as the boss negotiator.

From 1937 until the coming of the war to the United States in 1941, the C.I.O. was a dominating influence on New Deal philosophy. In 1937, the C.I.O. pushed its big

organizing drives in steel and automobiles; civil war threatened as a result of this, but Governor Frank Murphy refused to let troops be used against sit-down strikers in Michigan, and Myron Taylor of U.S. Steel suddenly and dramatically agreed to deal with Lewis and his Steel Workers Organizing committee. The so-called "Little Steel" strike kept hatreds boiling in 1937, and when Roosevelt dismissed both Tom Girdler of Republic Steel and John L. Lewis with a "pox on both your houses," he made a mortal enemy of Lewis. But labour as a whole stuck by Roosevelt, and the action of U.S. Steel in agreeing to deal with the C.I.O. firmly established collective bargaining as a fundamental pillar of New Dealism.

The other pillar of New Dealism in the late 1930s was trust-busting, which was the very antithesis of the NRA-ism of the first New Deal. Defeated by events and the supreme court in his ambition to set up what can only be described as a quasi-corporative state, Roosevelt, as the resourceful quarterback of his own figure of speech, decided to revert to an antimonopoly line. Before he did this, he took an ill-fated flyer in the unsuccessful attempt to pack the supreme court. If he had gotten his new court in one fell swoop, Roosevelt might have tried to revive the principle underlying the NRA. Lacking the legal basis for a suspension of the Sherman and Clayton antitrust legislation, however, Roosevelt began to listen to those who whispered to him that an antimonopoly crusade might effectively result in limbering up the capitalist system of production.

The antimonopoly fight began in late 1937, when the so-called "inventory depression" began to take hold. But it began in an atmosphere of philosophical confusion that had not been wholly dissipated by the end of 1946. Even when Robert H. Jackson, who preceded Thurman Arnold as chief trust buster in the department of justice, was busy denouncing monopoly, the New Deal was still promoting price supports in agriculture and in the coal business. Harold Ickes, the secretary of the interior, continued to advocate oil conservation at a time when federal prosecutors were accusing 16 oil companies in Wisconsin of conspiring to keep prices up (and the over-all consumption of gasoline down). To help clear away the fog, the TNEC—or Temporary National Economic committee—was set up, with Leon Henderson, a Securities Exchange commissioner, in charge. The avowed aim of TNEC was to discover just how and to what extent the U.S. economic system had become a victim of the stiffnesses of old age. Whether the TNEC achieved its aim or not was not decided; the war came along to pump money into the U.S. productive circuit, and the findings of the TNEC did not receive sufficient analysis to show just what they were worth. Meanwhile, however, Thurman Arnold had succeeded to Robert Jackson's job as chief trust buster—and the vigorous campaign which Arnold put on was an undoubted deterrent to price-fixers. As a matter of fact, Leon Henderson's own lung power may have been instrumental in keeping U.S. Steel from leading the steel industry in a general price rise in the late 1930s. Nothing could be proved, but it was a fact that Henderson did yell about price stiffness, and it was also a fact that U.S. Steel did resist the temptation to raise its prices at a time when Henderson was yelling.

Whether Franklin D. Roosevelt, as the chief New Dealer, ever succeeded in making up his mind between the NRA and the trust-busting approaches is doubtful; Frances Perkins, in *The Roosevelt I Knew*, indicated that Roosevelt never really understood economics, and Leon Henderson once admitted the difficulty of explaining to his boss just what made an economic system tick. In the matter of pub-

lic spending, Rooseveltian words could be found to support any position. In a speech delivered on Oct. 9, 1932, Roosevelt accused Herbert Hoover of having unbalanced the budget. The Democratic platform of 1932 supported the principle of budget balancing. Yet, during the first two Rooseveltian terms, the only economic constant at work was the federal "pump-priming" policy; whenever an economic recession threatened, the sluices of public spending and "government investment" were opened. And when the war came the spending became a torrent; taxation could not keep pace with it, and a national debt of about \$260,000,000,000 resulted. The national debt created by the exigencies of war and "lend-lease" was not a product of any conscious fiscal philosophy, Keynesian or otherwise. But its size might have been less if the New Deal of the late 1930s had had a stricter approach to the problem of the budget. As politicians, the New Dealers, like the Republicans before them, believed in the practical philosophy of "never voting for a tax bill or against an appropriation."

"Maturism."—While economic New Dealism had veered between the polar extremes of NRA and trust-busting, and between the economic nationalism of a Raymond Moley and the economic internationalism of a Cordell Hull or a Will Clayton, New Dealers were generally united in the belief that the U.S. economy had reached a stage of "maturity" that precluded any new *spontaneous* enlargement. Taking their cue from Englishman John Maynard Keynes and Alvin Hansen of the U.S., Roosevelt's intellectual advisers of both NRA and trust-busting faiths argued that "over-saving" and "under-investment" must henceforward be the chronic manifestations of the U.S. economy as long as the government refused to do its own "investing" in time of crisis. The opponents of the New Deal argued all along that the lack of private investment opportunities was a direct result of New Deal spending and taxing policies; in a world that frowned on the idea that an individual is entitled to keep more than a small proportion of what he makes, there was not much incentive to risk the untaxed cash that one already had in the bank. When state investments in war industry and war production took over in the early 1940s, there was no opportunity for the "maturists" and the "antimaturists" to fight out their battles under conditions that might be capable of proving the case one way or another. But the arguments over the theory of the mature economy went on during the war. When George Terborgh, in his *The Bogy of a Mature Economy*, boldly assembled his statistics to prove that new investment fields still beckoned, no New Dealer of note stepped up to refute the evidence. But "mature economy" thinking still permeated the various full employment bills which New Dealers kept introducing in congress up to 1946. The Republicans and the anti-New Deal southern Democrats finally succeeded in emasculating the New Dealers' idea of a proper full employment bill. But the "maturists" were almost certain to reopen the fight in the event of another "recession."

If the war had not come in Europe, the 1940 presidential campaign would very likely have been fought out over the issue of the "mature economy" pessimism of the New Deal philosophers. Certainly Wendell Willkie, who complained that Washington had become the only boom town in the whole U.S. under New Deal ministrations, was willing to fight it out along that line. The events in Europe, however, would not allow the voters to concentrate on domestic issues.

New Internationalism.—Although interventionist Democrats were quick to accuse the Republicans of being the

party of noninterventionism, both parties were forced into ambivalent positions by the record of the past. In 1937, Roosevelt floated a trial balloon in his famous "quarantine-the-aggressors" speech. But the reaction was a dud; some commentators even went so far as to accuse Roosevelt of using the international issue as an excuse to get people's minds off the appointment of Senator Hugo Black to the supreme court. Unable to arouse the nation to the menace of the fascist dictators, Roosevelt reverted to a generally passive foreign policy. He himself had followed a noninterventionist line in the early days of the New Deal. Item one: he had repudiated the League of Nations in order to get Hearst support in 1932. Item two: he had agreed to the "neutrality" legislation of the early- and mid-'30s, with its "cash-and-carry" and embargo provisions. Item three: he had acquiesced in the congressional investigations which sought to pin the blame for U.S. participation in World War I on the bankers and the munitions makers. Item four: his repudiation of the Cordell Hull line at the London Economic conference in 1933 was a factor in pushing the entire world into more intensive economic nationalism.

No doubt the pre-1937 noninterventionism of Roosevelt failed to represent his actual feelings—or his actual philosophical position. But throughout 1939, 1940 and 1941 it continued to betray him into ambiguous words and actions. In 1940 he promised, in his famous "again and again and again" speech, that U.S. boys would not be sent to fight in any foreign wars. But in 1941 he fought hard for the lend-lease program and for other "short-of-war" measures, and in late 1941, even before Pearl Harbor, the U.S. navy had orders to fire upon German submarines if they threatened to interfere with the conveying of lend-lease goods to Britain. The Roosevelt attempt to face up to the dictators was an essential part of latter-day New Deal philosophy. But U.S. action vis-à-vis Adolf Hitler and the Japanese was made jerky, unpredictable and confusing because of the hangovers of the earlier noninterventionist thinking of New Dealers. Thus the economic nationalism of the first, or pre-1937, New Deal lived on to plague the internationalism of the dominant New Dealers of 1940–41. Some "nationalist" New Dealers—Jerome Frank, Harry Hopkins, Rexford Tugwell—swung over to support the boss New Dealer in his new international position. But other early New Deal proponents—Senator Robert La Follette, Jr., of Wisconsin was one—quietly indicated their displeasure at the new turn of events.

The war quickly produced the "global" New Dealer—one who would extend the principle of Tennessee Valley authority river development to the basins of the Danube and the Yangtze. It also brought the "controlled economy" type of political philosopher back into Washington. Although NRA had been killed beyond resurrection by the supreme court, the essential practices of NRA—wage, price and investment controls—came back as a practical wartime necessity. When the shooting was over, the control-minded philosophers made the continuance of price control a test of New Dealism. Chester Bowles, who headed the Office of Price Administration during the last days of war and the first days of peace, resigned in a battle over the issue; and the followers of Bowles forthwith accused Pres. Harry S. Truman and his advisers of having deserted the Rooseveltian philosophy. Other prominent New Dealers—Harold Ickes, Henry Wallace—faded out of Washington in 1946. But the Truman Democrats insisted there would be no retreat from the "social gains" or the humanitarianism of

the New Deal, and the Republicans showed no disposition to abolish such things as the Truth-in-Securities legislation, the Securities Exchange commission, the Tennessee Valley authority, the principle of social security and the right of labour to organize for collective bargaining purposes. If these constituted the nub of "New Dealism," the New Deal had apparently come to stay. And if the new internationalism—or "participation" in the United Nations and other international bodies—was a strictly New Deal phenomenon, that had come to stay, too.

Common Denominator.—Looking for a common factor in the various speeches, articles and acts of New Dealers from 1937 to 1946, just one thing stands out. The common factor is reliance on the state to fill a gap, plug a hole or put out a fire whenever any ponderable group of citizens was in trouble. The U.S. was a subsidy economy to a not inconsiderable degree long before the advent of the New Deal, as the history of railroad land grants, pork-barrel bills and the protective tariff goes to prove. And in the Hoover days, from 1929 to 1933, the Reconstruction Finance corporation and the Farm board undertook to bring help to distressed business men and farmers. What the New Dealers did was to magnify and glorify what was already being done, and to extend it downward until it had reached all levels of the population. Help to the unemployed, aid for struggling artists, cheap public power for farmers, Tennessee Valley phosphorus for worn-out land, loans to Henry Kaiser for new industrial ventures—the New Deal undertook to provide them all. Through the mechanisms of the Import-Export bank and the Bretton Woods international currency arrangements, it also undertook to extend the subsidy principle to other nations. Whether it would all work out or not depended on the will to master the complex factors that go to make up good budget management and wise manipulation of the taxing power over a long cycle of time.

To the end of the decade, the U.S. congress had given no evidence that it could master these factors. But New Dealers lived in hope.

In any event, what the U.S. had left after the New Deal was not so much a new philosophy as a new set of facts. It had a more precarious economy and a more costly and cumbersome government. But it had also learned a lot about itself. The per capita public debt had risen, but to offset this the U.S. people had learned how to conserve their soil, how to reforest their landscape and how to control their rivers. Whether the U.S. knew enough to keep clear of an excessive statism still remained to be seen. Although elected four times, Roosevelt, the chief New Dealer, refused to entertain the idea of becoming a dictator, even though many of the tools useful to dictatorship were forged during his terms in office. Under the New Deal, there was much talk of "due process of administration"—i.e., government by decree. Generally speaking, the New Dealers were impatient with congress; they wanted to see power placed in the hands of administrative agencies. The U.S. people were now in the process of revolt against administrative assumption of power. The swing was away from this aspect of the New Deal. If the swing was shortly to reverse itself again, the New Deal might seem in retrospect to have been part of an irresistible world tide toward universal collectivism. And the original Tugwellian New Dealers, not the trust-busting New Dealers of the Thurman Arnold period, would have won the day. (J. CH.)

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Regulation by Government

The decade 1937-46 in the United States covered (a) the closing phase of one great crisis—the economic depression beginning in 1929, (b) all of World War II and (c) some of the aftermath of that war. The decade followed a period of crisis in which government controls had been indefinitely extended. From 1937 until the approach of war, there was no substantial extension, but rather a consolidation of the controls previously established. With the advent of the war there was a tremendous increase in controls, to a point far beyond anything heretofore experienced in the United States, and approaching almost a complete regulation of individual life, local government activity and all industry and commerce. Subsequently, there was a steady relaxation of wartime restrictions, and by the end of the decade it seemed as if the United States might return to substantially the same state of government control which existed just prior to World War II. In one field, perhaps, that of foreign trade, because of the abnormal conditions existing throughout the world, and a tendency of other governments to control their trade, increased control might be a permanent result of the war period.

The Prewar Period.—The opening of the decade found most of the depression-born agencies of governmental control already in operation in the United States. By 1937 such agencies as the Securities and Exchange commission (SEC), the National Labor Relations board (NLRB) and the Tennessee Valley authority, were established and operating. Emergency agencies such as the National Industrial Recovery board and the Federal Civil Works administration, had already ended their brief lives, and the first Agricultural Adjustment act had been declared unconstitutional. The Works Progress (later Work Projects) administration was in operation and destined to continue for some years more. Old-age insurance was a reality, with payments due to begin shortly, and the Reciprocal Trade Agreements act of 1934 had given the president certain arbitrary powers to reduce tariff rates. It was against this background of existing government powers that the 1937-46 decade must be viewed.

Foreign Controls.—Although in the field of foreign relations, the impact of the impending war came to be felt much earlier than in the domestic life of the United States, nevertheless there were federal controls of note during the period which belonged more to the peacetime interval between the two wars than to the war period itself.

There was a series of neutrality acts, beginning in 1935, based upon the general popular resolve "to stay out of the next war." The 1937 act increased the governmental restrictions in this sphere. It provided that when the president found that a state of war existed, there should be instituted an embargo on arms, and such other articles as the president determined, to belligerents. The act also made illegal any financial transaction in the securities of a belligerent nation or subdivision. A National Munitions Control board was established to ad-

minister the act, and all persons engaged in the business of manufacturing, exporting or importing munitions of war were required to register. The arming of U.S. vessels was prohibited, and travel by U.S. citizens on vessels of belligerent states was made unlawful. Other controls for similar purpose were provided. These neutrality acts were modified as the United States' entry into World War II came closer, and they were finally repealed. Other and different controls on foreign activities were then imposed which belonged more properly to the war period.

A corollary to the neutrality acts was the resolution passed at the beginning of 1937 making it a criminal offense to export arms or implements of war from the United States to Spain, where a civil war was raging. This embargo applied equally to both factions in the Spanish dispute.

Industry Controls.—During the prewar period after 1937, a few additional controls were imposed on industry. Thus, in 1937, congress passed the so-called Guffey-Vinson Coal act, giving the government power to promulgate a Bituminous Coal act of fair marketing rules and minimum prices, and a tax was levied upon producers who did not accept the code provisions. This was the most extreme regulation of any industry, other than public utilities, which the country had seen in time of peace. The act expired in 1943, at which time full wartime controls were in effect. With the expiration of those controls, there was no longer any special regulation.

Certain unfair methods of competition, rendered illegal by the Federal Trade Commission act, had been subjected to control by that commission since 1914. However, the Wheeler-Lea act, passed in 1938, considerably enlarged the commission's powers to deal with false advertising of foods, drugs, cosmetics and devices, and also to cover additional unfair or deceptive acts or practices in interstate trade. Then in 1941 the commission was also charged with administration of the Wool Products Labeling act, which required wool products to be fully and truthfully labelled to reveal their exact fibre content.

Another subject of regulation, in effect since 1906, was the labelling of foods and drugs. The earlier act on this subject was directed toward promoting purity, standard potency, and truthful and informative labelling of the commodities covered. In 1938 the Federal Food, Drug and Cosmetic act broadened the list of items covered and considerably tightened the machinery for effectuating the purposes of the act.

Two individual industries were also brought under strict governmental regulation in the United States during this period. These were the natural gas industry and the fast-growing civil aviation industry.

Prior to 1938 the Federal Power commission (FPC) had been regulating electric utilities operating in interstate commerce. In June of that year, the commission's jurisdiction was extended to the control of natural gas companies operating interstate. Wide regulatory authority was given over rates and distribution of natural gas. The extension of federal control to natural gas was not any substantial change in policy, since such gas was, as a rule, sold for domestic purposes to public utility companies having a monopoly of distribution, and this regulation, therefore, was no more than an extension of the general principle of public utility regulation.

Another special field entered by the federal government during this period was the control of commercial aviation. Such control became absolutely essential if the

airways were to remain safe and development proceed in a reasonably ordered way. The Civil Aeronautics act of 1938 created the first Civil Aeronautics authority with wide powers in policing the airways and landing areas, prescribing safety standards, setting rates and making regulations for the financial and operational control of the aeronautics industry.

Financial Controls.—The government had always undertaken a general regulation of banking activities, both in connection with its own fiscal operations, and in order to protect the public in a field where unregulated activity might easily lead to fraud. As a result of the depression, federal controls extended to the whole field of the issue of securities and their marketing, including the large stock exchanges. This led further to a specific regulation of public utility financing in which severe abuses had arisen.

The Securities and Exchange commission (SEC) was well launched in its activities before the decade began. However, several additional financial controls were imposed during this period. In 1938 the SEC's jurisdiction was extended to "over-the-counter" brokers and dealers who were required to register and adhere to the regulations prescribed. A year later the SEC's powers were further extended in the Trust Indenture act of 1939 to cover bonds, notes, debentures and other certificates of indebtedness, in order to protect investors. Finally in 1940 the SEC was authorized to control the activities of investment trusts, investment companies and investment advisers. By these acts virtually the whole of the financial community became subject to governmental supervision and control.

Agriculture.—The first Agricultural Adjustment act had been declared unconstitutional by the supreme court in 1936. Similar controls, however, were gradually reimposed, first as applied to sugar by the Sugar act of 1937, which empowered the secretary of agriculture to allot quotas of sugar production, provide benefit payments and make stipulations respecting the employment of labour. By 1938 a new Agricultural Adjustment administration was in effect, providing for sweeping controls of production with its concept of the "ever-normal granary." By vote of the farmers concerned, but practically in accordance with a government-declared policy, limitations were placed on the production of many essential products, acreage was limited and a very close regulation imposed on farmers in general. In the dairy industry, various marketing control acts amounted practically to price fixing of dairy products by areas.

Labour.—During the depression, in 1935, the National Labor Relations act imposed a new concept of regulations on labour relations. It forbade the employer to interfere with the formation of unions. It required him to bargain with a representative of a majority of his employees and not to bargain with any other employees. It imposed, therefore, a serious restriction on the right of employers to deal directly with their employees and forced them to accept representation by men selected by a majority of employees. Through the power of designating the bargaining unit, the government was able to destroy one union and build up another. Through the encouragement of the closed shop, employees were generally forced to join unions whether they wished to or not. The administration of the act by the National Labor Relations board limited the free speech of employers and their activity in many other ways in dealing with employees.

This regulation grew through the decisions of the board and the courts during the prewar period. During this period also, the Fair Labor Standards act of 1938 extended the regulation of employers. It established maximum hours of labour and minimum wages with compulsory overtime after 40 hours. It also outlawed oppressive child labour as defined by the children's bureau. The act was administered by a wages and hours division in the department of labour, and required an extensive and detailed investigation and regulation of industrial employers and many others.

Relief and Social Security.—During this period, some governmental controls were expiring. Most of these were the emergency relief activities of the early '30s. The Federal Emergency Relief administration expired in 1938; the Work Projects administration in 1942; emergency conservation work, which later became the Civilian Conservation corps, was ended in 1943 and the Public Works administration was being liquidated by the Federal Works agency that same year. The so-called Social Security program, first enacted in 1935, was amended and extended in 1939. In part, this program simply provided aid to the states to furnish relief for the aged, for widowed mothers, for the blind, for crippled children and for other special groups. Its old-age insurance features, however, amounted to a real extension of government controls, because it compelled all employees in the United States, with limited exceptions such as agricultural workers and domestic servants, to enter the system and have deductions from their pay rolls made to pay the insurance. Tremendous statistical operations were necessary, and the detailed features of the insurance for the aged and for survivors were definitely fixed by statute in accordance with government policy.

Wartime.—The imminence of war, its outbreak in Europe in 1939 and the entry of the United States into it in Dec. 1941, brought a host of new government controls more far-reaching than the nation had ever experienced before. No important aspect of the people's activity completely escaped the effects of this regulation.

Although ultimately all government regulation is designed to control individuals, most restrictions affect them primarily as members of some economic group, such as farmers, employers, wage earners, or taxpayers. This principle no longer applied when war became imminent.

The most obvious example of direct controls over the individual in the United States was Selective Service, which at first subjected men between the ages of 21 and 36 to military conscription for 1 year. By subsequent extensions and modifications, men from 18 to 64 were required to register, and those 18 to 45 became liable for military service. Limits as to length of service and overseas duty were dropped after the United States' entry into World War II. After the war ended, more limitations were again introduced, and the act was allowed to expire on March 31, 1947.

Government mobilization of men for the armed forces was direct. Only a little less direct was the mobilization of labour into war production work. As the army and navy drafted more and more of the nation's manpower, the war industries, also expanding, found their labour supply growing constantly shorter. To remedy this the government, acting through the War Manpower commission, took three successively more drastic steps. First was federal operation of the United States Employment service, which acted as a clearing house to place workers in essential jobs. The second step came in Dec. 1942, with the incorporation of the Selective Service system into the

War Manpower commission, and the substitution of "essentiality of employment" for dependency as a basis of draft deferment. Finally in April 1943 a blanket order was issued "freezing" essential agricultural and industrial workers in their jobs. Efforts to extend the draft of men for civilian work, however, failed when congress rejected the "Work or Fight" bill in 1945. All controls were abandoned soon after World War II ended.

The civil liberties of individuals in the United States were also subject to control, though not nearly to the extent experienced in other countries. A sedition law was made part of the Alien Registration act of 1940, and upon the United States entrance into World War II, a strict wartime censorship was imposed. The Office of Censorship examined all communications passing between the United States and any foreign country. In addition the office issued a set of principles to be used as a "voluntary" censorship code for the domestic press and radio. One of the first casualties of the Allied victory, this domestic censorship was terminated on Aug. 15, 1945, and the office and its remaining functions were abolished on Sept. 28.

Censorship is essentially negative in character. Its positive side is propaganda, and this is perhaps the most dangerous control of all because it attempts to channel and direct the individual's thinking. During World War II a centralized information bureau, the Office of War Information (OWI), carried out projects designed to provide both in the United States and overseas an understanding of the progress of the war effort and of the war policies, aims and problems of the government. The OWI was subjected to severe criticism on the grounds that it did not present the facts but only what it considered to be good for the people's morale, and was also actually propagandizing the partisan program of the administration in power. Its existence was terminated on Aug. 31, 1945, by executive order.

The individual in the United States, regardless of his economic status, was also directly affected by the wartime rationing of scarce consumer commodities. The purpose of rationing, of course, was to ensure a fair distribution of goods which were in scarce supply during World War II. Rationing was applied to automobiles, tires, bicycles, typewriters, fuel oil, gasoline, shoes, sugar, coffee, canned, dried and frozen fruits, vegetables, and fruit juices, meat (excluding poultry), butter and cheese. By the end of the decade, however, only sugar remained on the ration list.

Another control of little importance, but one which affected the entire population, was the imposition of daylight saving time for the duration of World War II in order to spread the hours of daylight more evenly through the working day, and thereby save fuel used for lighting. Soon after the war, this control too was abandoned by act of congress, standard time was restored, and different localities were again free to retain standard time or adopt daylight saving time as they saw fit.

Industry.—Government controls on industry in the United States were directed toward two major ends: first, and foremost, the production of essential materials for the war effort, and, second, reduction of the dangers of inflation inherent in a situation when normal production of civilian consumer goods was curtailed while high wartime incomes enlarged the public's purchasing power.

Conversion of industrial plants to production of war materials was begun before the United States entered the war. However, this was done on a piecemeal, plant-by-plant basis, under the guidance of the Office of Production Management (OPM). In Jan. 1942 however, the program was accelerated greatly by the War Production

board (WPB), which ordered a complete stoppage of automobile production the following month. Shortly thereafter many other industries received orders to convert to war production, and for the duration of World War II, production of civilian radios, washing machines, phonographs, metal office equipment and other similar commodities was stopped.

Outright requisition or commandeering of industrial resources was an even more stringent form of wartime control exercised over industry. Power to make such seizure was given to the president in cases where the plant or equipment was needed for defense and where the need was immediate with other sources unavailable. Later this power of requisition was also extended to essential war production which was halted because of a labour dispute. The power of requisition was applied in the case of aircraft plants, shipyards, coal mines, railroads and other activities less directly connected with the war effort. At the close of the decade the government was still operating the nation's bituminous coal mines, which had been shut down by a strike in 1946.

Another form of regulation of industry was provided by the elaborate system of priorities and allocations administered during World War II by the WPB. The major purpose of this program was to establish relative priorities on the uses of scarce commodities in order to insure the direction of the limited supply to the most vital needs. Allocations of these commodities were a natural counterpart of the priorities system, so that each user of scarce materials would receive the volume of each material to which he was entitled, and have some knowledge of what to expect.

The main control placed upon business in the United States in order to curb the inflation threat was price-fixing. The Emergency Price Control act of 1942 contemplated a selective price control setting ceilings on certain essential articles affecting materially the cost of living. The administration, however, was not satisfied with the results, and in 1943, under the powers conferred by the Stabilization act of 1942, a general freeze of all prices was put into effect by the Office of Price Administration. When strains became too great, subsidies were granted which reached a rate of nearly 2,000,000,000 a year at their height. These subsidies proved an effective method of completely regulating the industries so benefited; they became so dependent on the subsidies for existence that they were obliged to comply with all orders of the government, whether or not the orders were lawful. At the same time the National War Labor board was set up, and a general freeze of wages was attempted at a level of 15% over the wages at the beginning of 1941. In general the price freeze was superficially successful, with only a 2% increase in the cost of living over a two-year period. The attempt to freeze wages was not equally successful, and hourly rates during the same time increased by 10%. This wartime result was in no little measure due to the wholehearted co-operation of the public during World War II, and while some black markets existed, they were not an important factor in their general economic effect.

At the end of the European war in 1945, however, the strains of price control became much more difficult because of the increased costs resulting from inability to hold wage rates and the increased cost of many raw materials. Furthermore, popular desire to return to a free economy asserted itself, and black markets became rampant. In many fields, price control became still more impossible during

the winter of 1945-46 when the president approved a general increase in wages and salaries which generally amounted to about 20%. By the end of 1946 price control had been completely abandoned except as to sugar, rice and rentals. Control of rentals was particularly severe, because it was easier to enforce, but it was possible to enforce it only by arbitrary rules which gave little justice to many individual property owners.

The dual problem of stimulating production, and at the same time keeping prices in check, was also attacked by the granting of subsidies on critically short materials such as meat, dairy products, petroleum, rubber, strategic metals and many foods. In this way, when the ceiling prices provided insufficient profits to encourage the needed production for war use, government subsidies were used to bridge the gap.

Control over the production of necessary commodities needed for World War II was, of course, much more complete than it was in industries operating for civilian production. Not only was such production subject to the fixing of prices, but it was practically directed by the government through the leasing of government-built plants and the loaning of money to private concerns for necessary expansion. These industries were operated almost as if they were government directed. Operating in their own special fields, the Rubber Reserve company controlled all rubber supplies in the United States; the United States Maritime commission constructed the bulk of the merchant marine built up during the war and the Metals Reserve company acquired and dealt in strategic and critical metals and minerals needed for the war program. Many other commodities were dealt in directly by the government.

As an aid to all the foregoing business controls, complete regulation of imports and exports was undertaken by the government at an early date. A rigid system of export licences was imposed by the Board of Economic Warfare. At the conclusion of the decade such licences were still required, but were being issued by the Office of International Trade upon a considerably reduced list of goods.

In the field of transportation, wartime government controls were imposed by the Office of Defense Transportation to aid wartime industry by assuring the maximum utilization of the transportation facilities of the nation for the successful prosecution of World War II. Control of the allocation of boxcars continued long after the end of the war.

Labour.—In matters affecting labour, United States government controls were imposed for four major purposes; providing manpower for the armed forces; utilizing the civilian labour force as efficiently as possible for war production; keeping the productive forces of the nation in operation; and preventing inflation. Soon after the Pearl Harbor attack, the president summoned a joint meeting of employers and employees and demanded that they agree on a course of procedure which would maintain uninterrupted production. A partial agreement was obtained, the results of which were reflected in a decreased number of strikes during the war. The agreement expressed a willingness to abide by the decision of a government board, and such boards were established. After several different plans, the National War Labor board assumed complete control of the enforcement of this so-called agreement, together with the enforcement of the Stabilization act as to wages. The board undertook to fix wages and to settle

all other questions which might arise between employers and employees leading to industrial strife. Over the protest of employers, the board also decided questions relating to the closed shop and maintenance of membership. Whether the employers agreed or not, they acquiesced in the decision, and the unions in general, with some notable exceptions, kept their no-strike pledge.

When strikes began to become more frequent and finally a nation-wide strike of bituminous coal workers was called in 1943, congress passed the Smith-Connally act. This required a 30-day cooling-off period and a majority vote of workers before a strike could take effect in any war industry. It also authorized the president to seize and operate war plants. Heavy penalties were provided for labour leaders who instigated strikes in government-operated plants. A more drastic bill to deal with the coal and rail strikes of 1946 was demanded by the president, including the power to draft men to operate essential industries.

The strikes were settled, and no legislation of this nature was adopted.

Another phase of labour control, less closely related to war needs, was the development of the principle of fair employment practices to reduce hiring discrimination based on grounds of race, colour or religion. The wartime purpose of the Committee on Fair Employment Practice was to foster the greatest possible utilization of manpower when it was hampered by discrimination in employment.

Financial Controls.—The use in the United States of government power over banking and finance has already been mentioned. In addition, controls upon income were used, not only to help finance the war effort but also to prevent war profiteering and control inflation. A direct ceiling limitation of \$25,000 on individual salaries after taxes was ordered by the president in 1942, but this was soon abandoned in the face of widespread protest and doubtful legality. A more successful method was the imposition of a corporate excess profits tax which in extreme cases made a total tax of over 90%. High individual income taxes, especially in the upper brackets, were designed for the same purpose.

A unique form of regulation was authorized by the renegotiation statutes, which gave arbitrary power to government boards to fix a reasonable profit for war industries and confiscate the excess over such profit. While the boards had arbitrary power, they gradually came to adopt certain standards, but in view of the arbitrary power given, congress later furnished a general method of review. In effect, however, the renegotiation statute subjected all companies engaged in war production to a complete regulation of profits.

The volume of consumer credit available has a direct influence in increasing or decreasing inflation. During World War II the federal reserve system extended its control over credit, both from the banks, and in the form of installment sales to consumers. It also regulated the extent to which companies selling to consumers could extend credit at all.

These powers were gradually relaxed, but proposals were advanced to make them a permanent part of the U.S. credit control system.

Agriculture.—During World War II, most of the AAA controls on agricultural production were suspended because of the tremendous demand which was prepared to take all production. In fact, special inducements in subsidies were given to encourage production, and no effort spared to ensure high-level farm production. It was necessary to alleviate somewhat the draft on agricultural

labour through the deferment of essential farm workers. In general, the war resulted in less agricultural control rather than more.

Control of Science.—The principal scientific accomplishment of World War II years was the production of energy by atomic fission. The development of this process was wholly controlled by the governments of Canada, England and the United States acting together. The so-called Manhattan district of the United States army corps of engineers finally assumed complete control of research in the field of nuclear physics, and also took charge of the procurement and engineering features of the atomic bomb project.

Previously the research had been encouraged by the National Defense Research committee of the Office of Scientific Research and Development (OSRD). The OSRD also co-ordinated, encouraged and sometimes supported scientific and medical research in many other fields connected with war production. Radar, submarine and aeronautic devices, tropical diseases and medical research were examples of scientific projects co-ordinated and stimulated by the OSRD during World War II. In addition the office maintained a roster of scientifically trained manpower in the United States.

The Future of Government Controls.—Wartime controls were largely abandoned in the United States during the year and a half following the termination of hostilities. Where restrictions still remained, the outlook appeared bright at the end of the decade for their early termination. The few remaining rent and price controls were under heavy fire, and priorities and allocations were rapidly being abandoned, even in the critically short field of building materials, although the Emergency Housing Act of 1946 authorized the use of such controls to the end of the year 1947. Subsidies had practically been abandoned, except in the field of metals. The corporate excess profits tax had been repealed and renegotiation abandoned.

One exception to this tendency was the government's continued surveillance over the production and use of atomic energy, which, however, could be considered a special field.

There remained, however, a general attitude on the part of many to look to the federal government for the solution of every important national problem, and undoubtedly throughout the world the totalitarian concept was aggressively active. Unless vigorously contested, this would mean a steady increase in government controls. In the United States it could be combated principally by building up the importance of state and local governments, and confining federal action where insisted upon to financial assistance without government control.

Most active efforts to extend controls at the end of the decade 1937-46, however, related to further control of monopoly, of speculation and of business activities which had long been subjected to control in theory. Extensions of government controls in these fields and efforts to make them more effective could not be regarded as a general extension of government power. (See also BUDGETS, NATIONAL; LAW; UNITED STATES.) (Ro. A. T.)

Newfoundland and Labrador

A British colony, Newfoundland and Labrador temporarily renounced dominion status in 1933 because of financial difficulties. Newfoundland is situated off the coast of Labrador and Quebec; Labrador is situated on the northeast tip of the North American continent and extends from Blanc Sablon in the Strait of Belle Isle in the

south to Cape Chidley at the entrance to Hudson strait in the north. Area: Newfoundland, 42,734 sq.mi.; Labrador 110,000 sq.mi. Pop.: Newfoundland: (1935 census) 284,800; (1945 est.) 316,000; Labrador (1935 census) 4,716. Chief towns (1943 est.): St. John's (capital, 55,000); Corner Brook (12,500); Grand Falls (6,500); Bonaville (5,000). Religion: Roman Catholic (c. 94,000); Church of England (c. 93,000); United churches (c. 75,000). Governors: Vice-Admiral Sir Humphrey T. Walwyn (Oct. 1935-Jan. 1946); Sir Gordon Macdonald (after Jan. 1946).

Newfoundland made a tremendous contribution to World War II in relation to its size and potentiality and at the same time the war provided an economic stimulus which brought an extraordinary prosperity, in marked contrast to the poverty of the pre-1939 years. The aim of the commission of government in its reconstruction program was to secure for Newfoundland a means of livelihood less subject to the fluctuating influence of external economic conditions and in the year 1937 it appeared to have achieved a certain success. Exports and imports at \$51,900,000 (Canadian) were the highest since 1931; the total value of minerals exported created a record at \$8,000,000 and large deposits of hematite were discovered in Labrador. The progress of agricultural development was encouraging and the fisheries, while still far from being on a sound economic basis, showed signs of improvement. The Newfoundland railway achieved an excess of revenue over expenditure for the first time since 1923. The decrease of roughly 6,000 in the number of families on relief in Sept. 1937 compared with Sept. 1936 was a further indication of improved economic conditions. The optimism engendered by these encouraging signs was, however, short-lived, and in the two succeeding years a slump in two of the country's principal industries, fishing and newsprint, reflected the instability of the world markets. The Spanish Civil War and Brazil's imposition of high import duties on fish resulted in a fall in the value of exports of dried cod which the expansion of trade with the West Indies by no means counteracted; at the same time the recession of trade in the U.S. caused a setback in the newspaper industry and logging. The resulting unemployment could not be offset by the government's special short-term reconstruction program and the mining industry alone continued to work at full capacity.

As the hopes of Newfoundland's recovery dwindled, discontent with government by commission became widespread. The commission was criticized for its lack of a sense of publicity, and many Newfoundlanders complained that they were cut off from the government ultimately responsible for their welfare by a bureaucratic wall. In Sept. 1938 Lord Edward Stanley, then British dominions secretary, was forced to postpone a visit he was scheduled to make to Newfoundland and this increased the sense of frustration felt by the people. More drastic measures of agriculture and rural reconstruction were essential and in the autumn of 1938 J. H. Gorvin was sent from London to make a survey of the possibilities in this direction; in July 1939 he was appointed head of the department of rural reconstruction. Main features of his policy were the institution of a regional supply and marketing scheme under which loans would be advanced to fishermen to replace the individual credits given by merchants, and the regional development corporation, which would distribute land in small holdings of three-acre lots. This policy could not bear fruit immediately, however. The announcement of an increase in the parliamentary grant-in-aid to New-

foundland from £680,000 for 1938-39 to £1,000,000 for 1939-40 gave proof, if any were needed, of the country's depression. At the same time it must be noted that the government's expenditure on reconstruction had steadily increased from \$618,000 in 1937-38 to \$2,563,000 in 1939-40, the biggest proportion of which was spent on the departments of natural resources and public works. Good work was done by the fisheries board (instituted in 1936) in stabilizing the industry as far as possible. Small sums were spent on education, health and public welfare and the standard of living remained deplorably low. The chief item on the credit of the commission's balance sheet was the increased efficiency of administration. Although revenue (excluding grants and loans) had crept up since the commission took office, expenditure had increased in greater proportion and the deficit in the year ending June 30, 1939, was \$4,100,000.

In spite of these adverse conditions, Newfoundland threw itself wholeheartedly into the war effort from the start. In the first eight months about 7,000 men had joined the services and in addition some 3,000 loggers volunteered for timber felling in Britain. Two artillery regiments of Newfoundlanders fought in the European campaigns and a Newfoundland night fighter squadron fought with the royal air force. Newfoundland casualties in the war were about 600.

In 1940 the government published for information and comment the Special Areas bill, which roused considerable criticism from the press and the board of trade (the equivalent of a chamber of commerce in Newfoundland). Then came the fall of France and the government withdrew the bill on the grounds that expenditure at that period would not be justified. Total expenditure was to be drastically cut down and revenue increased by heavier taxation and the sale of war savings certificates. Moreover, the government entered into a formal agreement not to ask Great Britain for any financial aid so long as the war lasted. Responsibility for service of the debts guaranteed by the British government was taken over by Newfoundland, war loans to raise the money being subscribed locally in less than a week.

In Sept. 1940 facilities were granted to the U.S. to establish bases on the Avalon peninsula and the southern coast, and on Jan. 29, 1941, the first U.S. troops landed on the island. The Canadian government assumed temporary control of the airports at Gander and Botwood and began construction of an airport at Goose bay, Labrador. By a protocol to the Anglo-American Bases agreement, March 27, 1941, the U.S. government was granted a 99-yr. lease to these bases and Canada, under the terms of an agreement concluded with the Newfoundland government, was also granted a 99-yr. lease of the Goose bay airport. Responsibility for Newfoundland's defense was in the hands of the U.S. and Canadian authorities but the Newfoundland government remained in charge of civil defense.

The construction of the bases brought a wave of prosperity and 1941-42 were boom years. Newfoundland men working on the bases were paid higher wages than they had ever earned previously and there was a sharp increase in both the standard and cost of living. The basic industries were at this time favourably affected by world conditions, so that in July 1941 the finance commissioner was able to announce a record total revenue for the year 1940-41 of \$16,200,000. The government made a free gift to Britain of \$500,000 to establish a squadron of fighter aircraft, and in addition \$2,300,000 was lent to Britain free

of interest for the duration of the war. In all, Newfoundland lent Britain more than \$12,000,000 during World War II. In Sept. 1942, Clement R. Attlee, then dominions secretary, visited Newfoundland. Now that the country was once more self-supporting it was inevitable that Newfoundlanders should again feel restive about their form of government. The temporary nature of the current prosperity was, however, generally realized, and from his conversations with various bodies of opinion Attlee came to the conclusion that there were considerable differences as to what kind of change, if any, should be made. The trades union group wanted immediate self-government, whereas the board of trade in March 1943 sent a petition to the king asking that a royal commission be set up to inquire into the constitutional and financial problems of the island. In May 1943 Attlee announced the sending of an informal parliamentary mission to Newfoundland to get a fuller knowledge of its war effort and the problems likely to face it at the end of the war. The mission spent the summer of 1943 in Newfoundland and each of the three members presented an informal report to the British government. A considerable amount of debating time in the house of commons was devoted to Newfoundland and on Dec. 2, 1943, and again on Dec. 16, the government made a statement of policy in which it pledged itself to restore responsible government when Newfoundland was self-supporting and at the request of the people; but because of the abnormal conditions which World War II had brought, no change could be made until the end of hostilities.

In the summer of 1944 three members of the commission of government visited Britain for consultation with the dominions secretary as to the best form of machinery through which the people could express their views. The unexpected delay in the defeat of Germany meant, however, that the machinery could not be set in motion as soon as was hoped, but some effort was made in 1945 to re-educate the Newfoundlanders in the arts of self-government by the encouragement of local councils. It was not until March 1946 that the dominions office announced that a national convention of 40 members would be elected in June to make recommendations to the British government as to possible forms of future government. The British government would then ascertain the opinion of the people as a whole by means of a referendum. A group of Newfoundlanders led by Peter Cashin contested the right of the British government to authorize a national convention and demanded the immediate return of self-government. There seemed also to be a growing body of opinion in favour of confederation with Canada. Polling took place in Newfoundland on June 21, with a total poll of 70%. Because of communication difficulties, polling in Labrador took place from Aug. 8-Sept. 4.

The peak period of Newfoundland's prosperity was passed in 1943, but as the result of large contracts placed by the United Nations Relief and Rehabilitation administration and allocations by the Combined Food board the fishing industry revived and general prosperity was maintained. The airbase at Gander installed by the Canadian government at a cost of \$25,000,000 was handed back to Newfoundland for \$1,000,000 under the terms of an agreement signed by Canada, Great Britain and Newfoundland on May 8, 1946. Gander was to be the island's international airport and while not expected to be a source of revenue for some years could ultimately be a valuable asset.

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Newfoundland and Labrador: Statistical Data

Item	1938		1940		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain		4.86 Newfoundland dollars = £1				
United States		1 Newfoundland dollar = 99.4 cents		1 Newfoundland dollar = 85.1 cents		1 Newfoundland dollar = 89.8 cents
Finance						
Govt. revenues	£2,496 (\$12,204)*		£2,790 (\$10,684)		£6,444 (\$26,001)†	
Govt. expenditures	£2,764 (\$13,514)*		£3,682 (\$14,102)		£5,686 (\$22,945)†	
National debt	£20,309 (\$99,289)*		£22,062 (\$84,497)		£20,863 (\$84,182)†	
Transportation						
Railroads		838 mi.				
Highways		7,150 mi.				
Communication						
Telephones		7,800†		...		14,467
Telegraph lines		2,700 mi.†		...		1,021 mi.
Radio sets		7,240†		23,000		27,400
Minerals						
Iron ore		1,680,213 tons		1,689,815 tons		601,539 tons§
Copper (concentrates)		37,865 "		10,390 "		24,527 "
Lead ore (concentrates)		47,119 "		41,900 "		51,835 "
Crops						
Hay		85,008 tons				89,600 tons
Potatoes		54,450 "				57,750 "
Livestock						
Poultry		387,000		450,000		400,000
Sheep		90,000		98,000		95,000
Forest products						
Pulpwood		97,070 cords				38,622 tons
Pitprops		50,664 cords				9,222 cords
Christmas trees		247,877				
Sea products						
Cod liver oil		1,305,745 gal.				1,965,266 gal.§
Salmon		2,387 tons				857 tons§
Labsters		823 "				751 "
Exports-total†	£6,910 (\$33,781)				£9,552 (\$38,543)	
Paper	£2,780 (\$13,593)	3,000 tons			£2,476 (\$9,992)	280,000 tons
Iron ore	£897 (\$4,386)	1,940,000 "			£455 (\$1,836)	887,000 "
Dried cod	£793 (\$3,877)	398 "			£2,176 (\$8,702)	36,000 "
Imports-total†	£5,729 (\$28,011)				£14,079 (\$56,808)	
Flour	£521 (\$2,547)	40,000 tons			£501 (\$2,020)	40,000 tons
Apparel	£469 (\$2,293)				£1,037 (\$4,186)	
Machinery (nonelectrical)	£455 (\$2,225)				...	
Education						
Schools		1,156†		1,898		
Students		62,497†		66,508		
*Fiscal year ending June 30. †Fiscal year ending March 31. ‡1937. §1943. ||1939 ¶Newfoundland only.						

stitutional Government in Newfoundland, 1783-1832 (London, 1941); Lord Ammon, *Newfoundland: the Forgotten Island* (London, 1944); Dominions Office, *Report on the Financial and Economic Position of Newfoundland*, Cmd. 6849 (London, 1946). (J. RA.)

New Guinea

One of the largest islands in the world, New Guinea is separated from the smallest continent, Australia, by the shallow Torres strait. The island lies between the equator and 12° southern latitude. Its total area is 312,129 sq.mi. The 141 E. meridian separates the western territory under Netherlands rule (151,789 sq.mi.) from two eastern dependencies under Australian rule: British New Guinea, better known as Papua, in the southeast (90,540 sq.mi.), and the former German colony, now the Mandated Territory of New Guinea in the northeast (69,800 sq.mi.)—the boundary between the two running roughly along the watershed of the central mountain spine. (See NETHERLANDS INDIES.)

The island's tropical climate and rugged topography, its dense rain forests, torrential streams and mosquito-infested plains and morasses rendered difficult not only profitable modern land uses but even exploration. The same conditions also explained the sparseness of the indigenous population, composed of Melanesian, Australoid and Negrito elements. Its numbers were estimated as about 500,000 for Netherlands New Guinea and twice as many under Australian rule. The density of the indigenous population was estimated as 3.7 per sq.mi. for Papua, 6.2 for the Mandated Territory and 1.9 for Netherlands New Guinea.

European settlements remained small, and, for the most part, close to the shore. Settlements of Javanese, Chinese and other Orientals likewise were scattered and nowhere had assumed noteworthy proportions. Although the highlands of New Guinea were sometimes mentioned as available for white colonization, aerial surveys showed that the

areas suitable for agricultural uses were discontinuous and difficult of access; only where unusual natural resources, such as oil or gold, were found would it pay to construct the necessary means of communication. The more accessible plains, after clearance of the virgin forest or jungle, often are so leached by heavy rainfall that the top soil, never fertile or deep, is soon exhausted. In all of these respects, however, Papua and the Mandated Territory are in a slightly better condition than Netherlands New Guinea.

Exotic Birds and Gold.—Not situated on or near one of the great routes of communication connecting the continents of the world, New Guinea's sparse and underdeveloped population did not produce in significant size raw materials which elsewhere in southeast Asia attracted the attention of the western world. That is why at the end of the 19th century little was known of the island in general and hardly anything of the interior.

The Netherlands eastern part of the land made some reputation as the home of the paradise and other magnificently coloured birds. In the first two decades of the 20th century this had led to a profitable trade in bird feathers for fashions in Europe and in the western hemisphere. However, this profitable trade came to an end when styles changed, and when the Netherlands Indies government stepped in, first to restrict and later to prohibit the shooting of these birds.

Meanwhile, the trade in exotic birds and the discovery of gold in the Australian part of New Guinea focused attention on the island. These conditions, as well as scientific interests, brought about a number of private and governmental scientific expeditions to explore the island more fully. The Australian eastern part, less extended than the Netherlands western part, was fully charted by the end of 1946. In the Netherlands section, almost all of the island had been explored. The highest peaks in the

central mountain range in Netherlands New Guinea had been scaled.

Transportation in these wild rugged mountains and vast morasses was the bottleneck for explorative purposes. Even before World War II, however, the aeroplane came into use for this purpose. A Dutch expedition to a snow peak was provided with parachuted supplies. A U.S.-Dutch expedition situated its base camp on the border of an inland lake from where communication with the coast was served by hydroplane.

When war in the Pacific broke out in Dec. 1941, a Netherlands expedition was on its way to fill in the remaining blank spots on the map of Netherlands New Guinea. The expedition had to be discontinued, but a few members of the expedition stayed on and, although harried by the Japanese, maintained communication with Netherlands Indies government agencies which, after the surrender of the Indies to the Japanese, were established in Australia. These members of the expedition practically fulfilled the expedition's mission. After a year they were picked up by aeroplane.

Administration and Development.—In the footsteps of the scientific explorers, administrators came and established regular government, starting with stations on the coast and penetrating gradually into the interior. With them came physicians and teachers, preceded and followed by missionaries, Protestant and Roman Catholic.

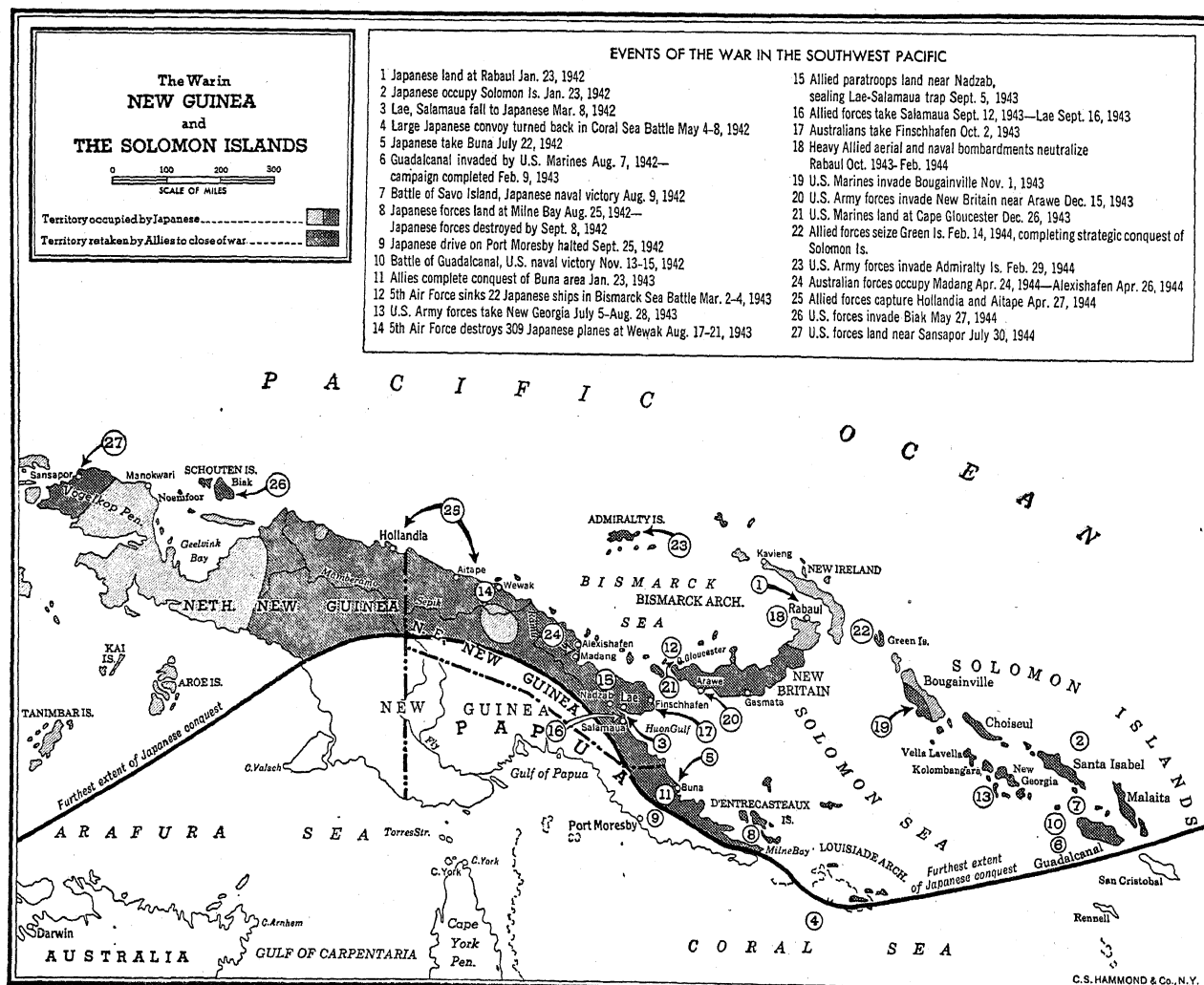
When World War II broke out, the whole island of

New Guinea was under regular administration with the exception of the most remote and inaccessible areas in the Netherlands section of the island. The term "regular administration" should not, however, in relation to New Guinea, be taken in its western sense. The possibilities of administration in a land of primitive nomads, scattered in relatively small bands over a wide area of inhospitable land, were far less than in a modern country.

The results of the explorative expeditions were of scientific rather than practical value. They proved that the resources of the island in relation to its soil and its population were poor, more so in the Netherlands territory than in the Australian sector.

The resources in the subsoil, however, had not been fully discovered. Gold exploration in the Australian part of the island was important. Here Australians did a remarkable job, setting up a gold industry with aurally transported machinery. Oil was discovered in the Netherlands part. A joint oil company, in which one Dutch and two U.S. oil companies participated, each for a third, received a contract from the Netherlands East Indies government to explore and exploit oil. The most modern methods, aerial photography among them, were used on an extensive scale to explore the presence of oil layers. Test drillings were made; results were not conclusive.

Since native production had been very low and insignificant both in the Netherlands and in the Australian part of the island, endeavours were made to establish non-native agricultural enterprises. These enterprises met with success in the Australian section, where they profited from





Smoke screen shielding U.S. paratroopers jumping at low altitude from transport planes during an attack on the Japanese-held Markham valley of New Guinea, Sept. 5, 1943

a near-by-home market, and from a system of indentured labour. The latter, however, attracted mounting criticism. In the Netherlands territory no indentured labour was introduced. Development was along lines of native owner-cultivation of the land under scientific government supervision, and of estates-agriculture employing free native and imported labour, mostly Javanese. A rubber estate was set up by the government of the Netherlands Indies as an experimental station.

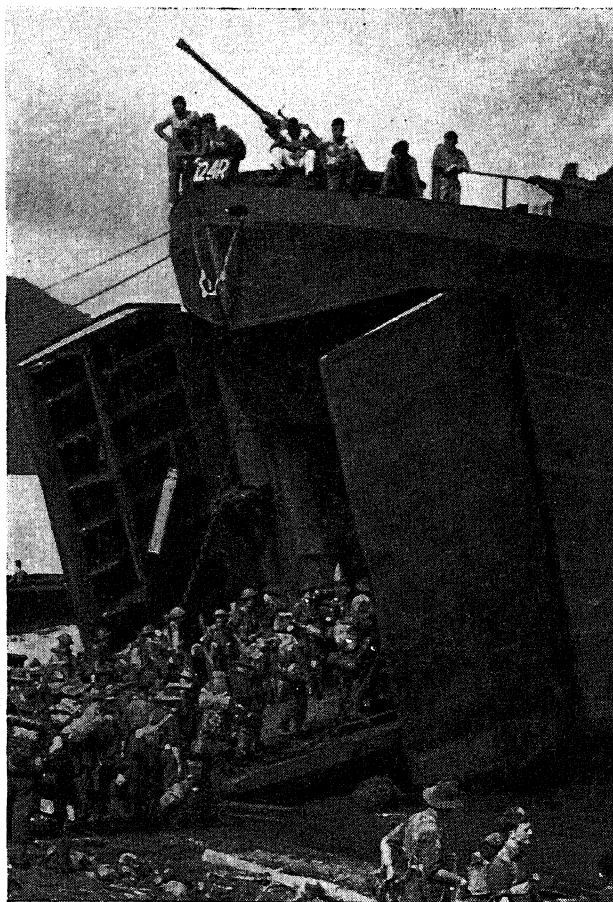
In the '30s the Netherlands government thought it unwise to frustrate all Japanese requests to concessions in the Netherlands part of New Guinea. Consequently Japanese interests were allowed a timber concession near Geelvink bay, and 500 acres at Momi near Manokwari to experiment with cotton. Both economic attempts came to naught.

War and Limelight.—When war broke out in the Pacific in 1941, the huge island of New Guinea, in the shape of a prehistoric animal shielding Australia against a southward drive of a northern foe, came out of its relative obscurity into the limelight of public attention. For months on end, main events of the war were staged there.

If the Japanese forces had not been delayed by the gallant defense in the Philippines, in the Netherlands Indies and in Malaya, where Americans, Netherlands and Britons fought side by side with Filipinos, Indonesians and Malays, there seems to be little doubt that the whole of New Guinea would have fallen prey to the Japanese and that Australia would have suffered invasion. As it was,

New Guinea and the seas and islands around its tail became the contested perimeter between Japanese forces on the one hand and U.S.-Australian forces assisted by Netherlands units on the other. The Japanese practically took the northern part of the island, but could not conquer Papua and Port Moresby, nor the southwestern part of Netherlands New Guinea with Merauke as its centre. The latter area had been the only part of the Netherlands Indies where the Japanese could not enter.

After the battles of the Coral sea and Guadalcanal, where Japanese endeavours to lay a basis for invasion of Australia were frustrated, the limits beyond which Japanese might in this part of the world could not go were fixed. In the autumn of 1942, a daring drive of Japanese army units from the north coast of New Guinea over the Owen Stanley mountain range southward with intentions of capturing Port Moresby, civilian and military headquarters of Papua, was frustrated first and counteracted subsequently by General Douglas MacArthur's northward thrust over the same mountain range. This drive of MacArthur's was the first in history which had to rely entirely on air transportation, since there were no land communications. Here also were the experimental beginnings of the strategy and tactics which later developed into the leapfrog occupation of military bases, first along the north coast of New Guinea, driving the Japanese from such bases as Lae, Salamaua and Finschhafen, and later on northward in the direction of the Philippines. Sustained by superiority on the sea and in the air, this strategy broke Japanese resistance on the bases desired and left Japanese forces between the occupied bases to wither on the vine. The



Australian soldiers boarding a U.S. "LST" for transport to Lae, New Guinea, where they landed Sept. 4, 1943

Japanese army had to take to land cultivation in order to avoid mass starvation, which nonetheless was the lot of tens of thousands of Japanese soldiers in New Guinea. The native population, maltreated by the Japanese, turned against them. In almost all the Japanese bases retaken by the Allies, the sorry lot of labour forces from Java came to light. At Manokwari an original force of 1,700 Japanese was reduced to 217 emaciated survivors.

When Hollandia, township on the north coast of Netherlands New Guinea, was occupied in April 1944 by the leapfrog strategy, a military base of the first order was established for the forces destined to invade the Philippines. Never in history had more modern and extended bases been built in a land as primitive as New Guinea. Formal Japanese surrender took place on a British aircraft carrier off Rabaul on Sept. 6, 1945. The Japanese naval forces in New Guinea surrendered five days later. (See also WORLD WAR II.)

Postwar.—When the Allied forces landed at Hollandia in April 1944, they were accompanied by a group of 100 Netherlands Indies civilian officials who, first under the military command and later under their own government, inaugurated a new policy—the complete merger of the Netherlands and the Indonesian civil services which previously had been separate. Later, such groups, under the Netherlands Indies Civil Affairs administration, replaced in every reoccupied district the badly shattered administrative personnel.

Without waiting for the adoption of the promised new constitution (see NETHERLANDS INDIES), complete equality was already established in the training and assignment of these officials; Netherlands frequently serving under Indonesian superiors and all being subjected to the same

regulations. Native local officials such as the heads of villages, who had remained remarkably loyal to the government under trying conditions, helped to re-establish normal government. At first, the resettling of refugees as they returned from the wild mountain country, and the distribution of food and other necessary supplies, made heavy demands on the combined staffs under military direction.

Australian New Guinea remained under army control until Oct. 1945, when Papua and that part of the Mandated Territory south of the Markham river at Lae were placed under a provisional combined civil government. The rest of the territory was placed under the authority of that government in June 1946. Immediately, Australia's minister of external affairs introduced a program of reforms designed to recognize the principle of trusteeship, not only for the Mandated Territory, but for Papua as well. They were merged by the Papua-New Guinea Provisional Administration act of July 19, 1945. Among other provisions, this act abolished indentured labour and professional labour recruiting; a limit was set on the number and age groups of natives who might be drawn from any village for outside employment. The act also provided for "ultimate participation in self-government by the natives" and for a vigorous promotion of native subsistence farming. Health and education were to be among the first claims on an enlarged budget.

Although the Netherlands authorities already had gone far in legislating for the security and advancement of the indigenous population, the disturbances in Java which accompanied and followed re-occupation of that island temporarily delayed the introduction of any far-reaching changes in the administration of the outer provinces. In the discussions concerning constitutional changes between the Netherlands officials and Indonesian nationalist leaders, an outstanding problem was that of administration for populations which, as in New Guinea, were still largely following a traditional way of life and had only recently emerged from a pre-agricultural stage of tribal development.

New Guinea (Territory): Statistical Data				
		1938		
Item	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate				
Great Britain . .		£A 1.25 = £1		£A 1.26 = £1
United States . .		£A1 = \$3.895		£A1 = \$3.051
Finance				
Government revenues . . .	£404 (\$1,973)		£336* (\$1,355)	
Government expenditures . .	£405 (\$1,981)		£343 (\$1,381)*	
National debt . .	£25 (\$123)		£13 (\$49)	
Minerals				
Gold		236,133 oz.		278,922 oz.
Crops				
Coconuts		85,063 tons		80,173 tons
Livestock				
Cattle		19,207		20,494
Goats		8,254		9,327
Exports				
Total	£2,387 (\$11,668)	97,000 tons	£2,927 (\$11,210)	...
Gold	£1,617 (\$17,904)	410,000 oz.	£2,408 (\$9,221)	492,000 oz.
Copra	£675 (\$3,302)	83,000 tons	£402 (\$1,540)	66,000 tons
Imports				
Total	£1,309 (\$6,398)	68,000 "	£1,010 (\$3,870)	..
Metals, manufactures and machinery . .	£507 (\$2,478)	...	£308 (\$1,181)	...
Foodstuffs of vegetable origin . .	£152 (\$743)	...	£131 (\$503)	...
Apparel, textiles and manufactured fibres . .	£145 (\$711)	...	£104 (\$398)	...

*1941.

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New Hampshire

One of the New England group and one of the original states of the union, New Hampshire is popularly known as the "Granite state." Area 9,304 sq.mi., including 280 sq.mi. of water. Population (1940) 491,524, of which 57.6% was urban and 42.4% rural. Of the total population, whites numbered 490,989, including 422,693 native and 68,296 foreign born. Capital, Concord (27,171). Other cities: Manchester (77,685), Nashua (32,927), Berlin (19,084), Dover (14,990) and Portsmouth (14,821). Estimated population, July 1, 1944, 457,231, representing a decrease of 7%.

During 1937, Alphonse Roy (Dem.) unsuccessfully contested the seat of U.S. Representative Arthur B. Jenks, following their election tie of 1936. Important measures passed by the legislature in its 1937 session were: a 48-hr. act for women and minors in labour; acts establishing a state milk control board; a state police, and a state department of public welfare to administer poor relief and old-age assistance and to supervise state welfare institutions.

In the state election of Nov. 8, 1938, Francis P. Murphy (Rep.) received 107,841 votes and John L. Sullivan (Dem.) 80,847 for governor. For U.S. senator, Charles W. Tobey (Rep.) received 100,633 and Fred H. Brown (Dem.) 84,920. On June 9, 1938, the U.S. house of representatives had voted to unseat Arthur B. Jenks (Rep.), returning to congress from the 1st district and to give his place to Alphonse Roy (Dem.). Jenks had defeated Roy by a vote of 52,174 to 44,681. A convention for revision of the state constitution met from May 11 to June 1, 1938. Four proposed amendments were submitted to the electorate and voted upon Nov. 8: (1) to authorize graduated income and inheritance taxes and a sales tax; (2) to permit absentee voting in state elections; (3) to give the legislature power to define paupers as related to prohibitions against voting; (4) to prevent the diversion of gasoline taxes to other than highway use. Only the last mentioned amendment was adopted, a two-thirds majority being required. On Sept. 21, the state was swept by a hurricane which did great damage to standing timber, buildings and power systems.

The 162nd session of the general court extended from Jan. 4 to June 17, 1939. Important measures enacted were those authorizing a \$5,000,000 bond issue for construction, reconstruction and maintenance of highways and for reimbursement of towns for hurricane and flood damage; levying a 15% tax on all tobacco products as a means of eliminating the direct tax of \$1,200,000 a year; approving acquisition by the federal government of land, at four sites in the state, for construction of flood control

dams; and extending legality of pari-mutuel horse race betting through 1942.

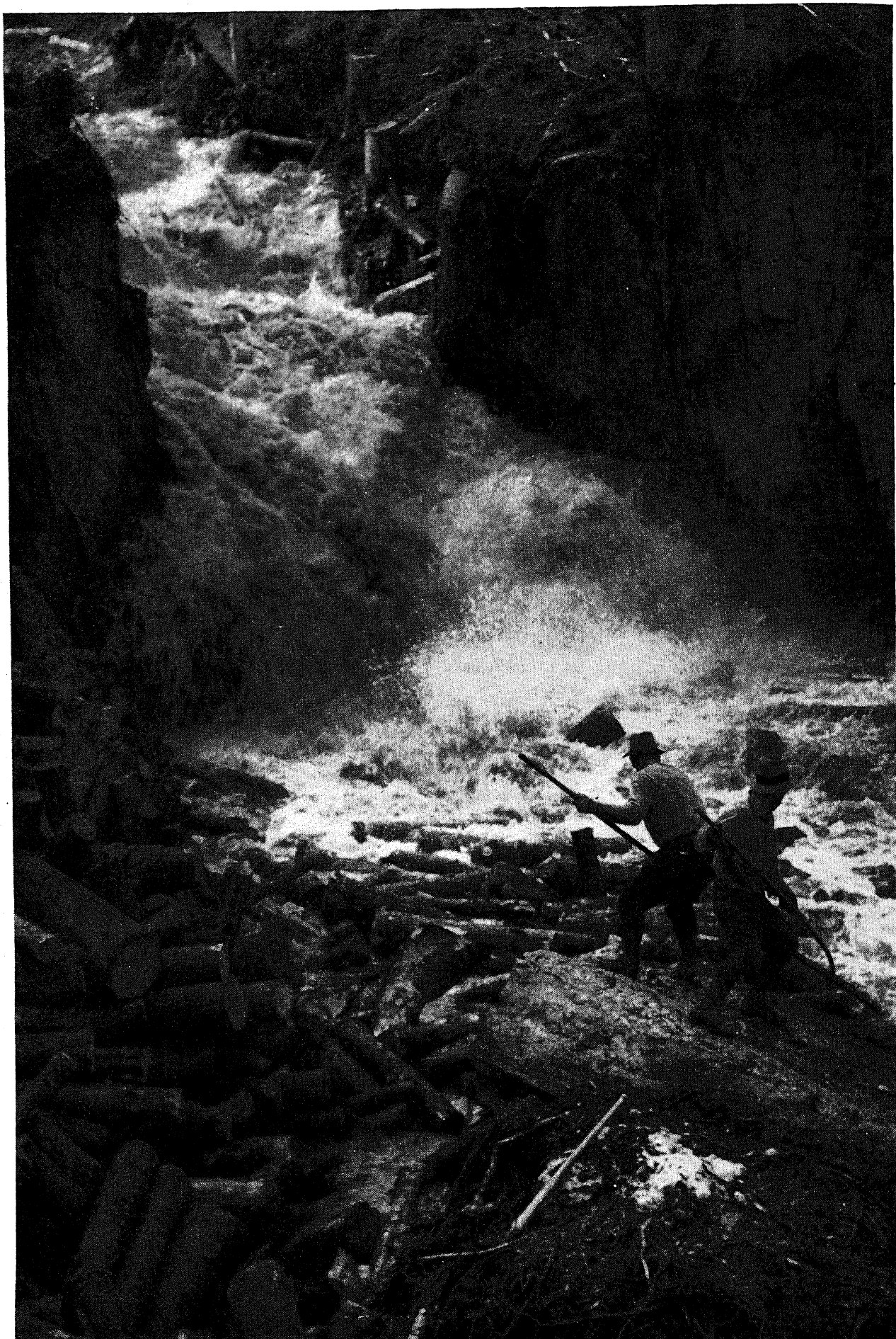
Robert O. Blood (Rep.) was elected governor in the Nov. 1940 election. Other officers were: secretary of state, Enoch D. Fuller; treasurer, F. Gordon Kimball; commissary general, Charles F. Bowen; attorney general, Frank R. Kenison (all Republican). In the general court in 1941 were 12 Republican senators, 9 Democratic and 3 elected by both parties. The house of representatives included 229 Republicans and 194 Democrats. While the state government was controlled by the Republicans as a result of the 1940 election, Roosevelt carried the state by a popular vote of 125,292 as compared with 110,127 for Wendell L. Willkie. During 1940 the state supreme court held as constitutional the sales tax on tobacco levied by the legislature at its last session. The revenue from this tax made it unnecessary to collect any state property tax. The state completed a large flood control and conservation project on the Connecticut river, while the war department began the construction of flood control projects at Surry mountain on the Ashuelot river, at Webster on the Blackwater river and at Franklin Falls on the Pemigewasset.

The general court met in its 163rd session from Jan. 1 to June 13, 1941. Important legislation included an act setting up a state council of defense; an antisabotage act; a law for regulating the sale and handling of explosives; an act establishing a state guard regiment for local military defense; a capital budget act carrying an appropriation of \$216,000 for new construction and improvements to state buildings; and an act abolishing the 2% capital stock tax on domestic insurance firms. The state constitutional convention was reconvened Sept. 23 to consider reduction of membership in the house of representatives, which stood at a high of 423. A proposal was adopted designed to effect a reduction of approximately 60 seats, which was to be submitted to the voters at the state election of 1942.

In the election of Nov. 1942, Robert O. Blood (Rep.) was re-elected governor by a vote of 83,766 over 76,782 for William J. Neal (Dem.). H. Styles Bridges (Rep.) was re-elected U.S. senator by a vote of 88,601 over 73,656 for Francis P. Murphy (Dem.). The voters approved the amending of the state constitution to permit the reduction of the house of representatives from 423 to a number between 375 and 400. During 1942 the activities of the state council of defense were greatly extended, and an increase of the state guard to four battalions was authorized.

The general court was in session from Jan. 6 to May 20, 1943. Measures passed included an act granting broad emergency war powers to the governor and council; an act creating a state veterans' council, to aid returning soldiers and ensure them preference in public employment; and an act providing for a soldiers' bonus, to be paid any resident of the state serving more than 90 days in the armed forces, such bonus to amount to \$10 a month for each month of service, the total not to exceed \$100. To finance bonus payments, the poll tax was increased by \$3.

In 1944 a special session of the general court was convened, and acts were passed exempting veterans of World War II from payment of the poll tax and the property tax on real estate up to \$1,000 valuation; permitting absentees to register for voting purposes by affidavit; and providing for absentee voting by members of the armed forces and civilians serving with the armed forces. At the general election of Nov. 7, Franklin D. Roosevelt received 119,663 votes and Thomas E. Dewey 109,916. In the election for



governor there were 115,799 votes for Charles M. Dale (Rep.) and 102,232 for James J. Powers (Dem.).

The general court was in session from Jan. 3 to May 18, 1945. Among measures passed were acts to guarantee re-employment of veterans by towns and other political subdivisions of the state; to provide an aerial survey of the state; to abolish the special poll tax of \$3 enacted in 1943; to create a retirement system for state employees; to provide temporary additional compensation for state employees; and to promote the cause of soil conservation. A joint resolution authorized a referendum, by towns, on the question of United States membership in a general system of international co-operation, with police power to maintain world peace.

The general court was not in session during 1946; town meetings were held on March 12 and the state primary election on Aug. 6. At the general election in Nov. 1946, Gov. Dale was re-elected governor by a vote of 103,204 over F. Clyde Keefe (Democrat), who received 60,247. The Republicans also won decisive majorities in the state senate and house of representatives. On a referendum for calling a convention to revise the state constitution, 49,230 votes were cast in favour of the proposal and 29,336 against. The state poll tax was reduced from \$5 to \$2, as a result of action taken by the general court in 1945, repealing the levy of \$3 to provide revenue for a soldiers' bonus.

State officers in 1946, in addition to Gov. Dale, were: secretary of state, Enoch D. Fuller; state treasurer, F. Gordon Kimball; commissary general and adjutant general, Charles F. Bowen; attorney general, Ernest R. D'Amours; commissioner of education, James N. Pringle, succeeded on Feb. 16 by Edgar Fuller.

(WE. Ss.)

New Hampshire: Statistical Data

Table I.—Education (Public)

	1938	1942	1943	1944
Elementary pupils	56,072	51,771	50,241	48,424
High school pupils	20,318	20,744	19,537	17,622
Elementary teachers	1,764	2,060	2,114	2,065
High school teachers	1,091	991	1,006	924

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1937	1939	1940	1942	1944	1945
Cases on general relief	9,943	7,559	6,872	5,884	2,654	2,185
Cost of general relief	\$283	\$174	\$159	\$156	\$72	\$62

Table III.—Communications

(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1944
Highway mileage		3,584	3,613	3,635	3,701	
Expenditure on highways . . .	\$9,523	\$7,787	\$8,815	\$8,386	\$8,743	\$4,315
Railroad mileage	1,007	1,013	1,003	1,002	992	

Table IV.—Banking and Finance

(Money figures in thousands of dollars)

	1937	1939	1940	1942	1943	1945
State revenue	\$18,515	\$19,754	\$39,375	\$32,181	\$25,862	\$31,969
State expenditure	\$16,909	\$14,800	\$39,111	\$31,218	\$26,114	\$30,876
Number of natl. banks	52	52	52	52	52	52
Deposits of natl. banks	\$66,247	\$74,032	\$79,197	\$93,734	\$118,217	\$171,475

Table V.—Agriculture

(All figures in thousands)

	1937	1939	1940	1942	1944	1945 (est.)
Leading crops (bu.)						
Apples	1,050	1,214	925	961	778	139
Corn	630	615	600	630	640	546
Hay (tons)	420	394	427	425	360	422
Oats	280	259	280	273	259	252
Potatoes	1,479	1,395	1,634	1,088	1,064	986
Maple syrup (gal.)	61	58	62	66	57	25
Maple sugar (lb.)	58	26	23	44	25	9

Log drivers at work on the Swift Diamond river in northern New Hampshire. Lumbering, as well as the production of paper and pulp, remained among the more important industries of the state during 1937-46

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1943
Wage earners	56,517	55,781	
Wages paid	\$55,235	\$52,735	
Value of products	\$249,632	\$237,396	\$393,055

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940 (est.)	1941	1943
Value mineral production	\$1,220	\$1,147	\$1,187	\$1,065	\$1,383	\$1,350
Leading products (value)						
Stone	443	445	437			
Clay	300	278	322			
Sand and gravel	253	234	219			
Feldspar (crude)	156	136	162			

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New Hebrides

See FRENCH COLONIAL EMPIRE; PACIFIC ISLANDS, BRITISH.

New Jersey

One of the middle Atlantic states, known as the "Garden state," New Jersey entered the union on Dec. 18, 1787. Area, 7,836 sq.mi., including 314 sq.mi. of water; pop. (1940) 4,160,165. Capital, Trenton (124,697). Other cities: Newark (429,760); Jersey City (301,173); Paterson (139,656); Camden (117,536) and Elizabeth (109,912). On July 1, 1944, the bureau of the census estimated the civilian population at 4,167,840.

In 1937, A. Harry Moore (Dem.) was elected governor for the third time, the first 3rd-term governor in the history of the state. He defeated Senator Lester H. Clee (Rep.) by 45,000 votes. The Republicans, however, won control of both houses of the legislature. The state appropriated \$12,000,000 as aid for municipalities in meeting the relief problem, but the sum was insufficient. The legislature was reconvened, in Nov. 1937, to appropriate additional funds but failed to do so. The burden of meeting the deficit was shifted to the governor, who raised the necessary \$3,000,000 from general sources.

The year 1938 was notable for the comeback of the Republican party in New Jersey. W. Warren Barbour ran as the Republican candidate for the unfinished term of Governor Moore. He defeated his Democratic opponent, William H. J. Ely, by 107,000 votes, carrying 19 of the state's 21 counties. In addition the Republican majority on joint ballot in the 1939 legislature was increased from 27 votes in the 1938 session to 55 for 1939. About \$10,000,000 was provided to assist municipalities, and the total relief bill was in excess of \$20,000,000. The state pay roll reached an all-time high of \$22,000,000 because of increased personnel and restoration of salary deductions. The legislature enacted legislation fixing prices in general trade and in the liquor business. New Jersey railroads lost their appeal in the third United States circuit court to upset the system of assessing their property. The year also witnessed the Hague-C.I.O. struggle in Jersey City, and an injunction was issued in the United States district court enjoining Mayor Hague from interfering with civil liberties.

During 1939 the Republican party added to the gains begun in 1938. Only legislative and local offices were at stake, but the Republicans took control of the 1940 legislature by the largest majority since 1930. A constitutional

322 provision against gambling was modified at a state-wide referendum to permit pari-mutuel betting at race tracks. The legislature authorized a referendum on a bond issue of \$21,000,000, representing the state's share of relief for 1940-41. The referendum was carried by 47,000 votes. The United States district court declared the state's formula of taxing railroads to be invalid and in effect cancelled approximately \$15,000,000 which the state claimed to be due for 1934-36. The controversy between Mayor Frank Hague and the C.I.O. was terminated by the United States supreme court. An ordinance, under which the police power was used to prohibit public meetings in streets and parks, was ruled unconstitutional.

In the 1940 election President Roosevelt received 1,016,404 votes and Wendell Willkie 944,876. Charles Edison, former secretary of the navy, was elected governor over Robert C. Hendrickson, his Republican opponent, by 63,875 votes. But W. Warren Barbour, candidate for a six-year term in the U.S. senate, defeated Democrat James H. R. Cromwell and the Republicans rolled up a majority of 79,979 on the basis of the average assembly vote. Accordingly the Republicans retained control of the assembly by a majority of 41 to 19 and of the senate by a majority of 16 to 5. The election was preceded by a Republican drive against the Hudson county organization of Mayor Hague. The legislature tried unsuccessfully to compel the installation of voting machines in Hudson and the committee on campaign expenditures of the U.S. senate assigned investigators to the county. The Republican legislature also reorganized the election bureaus in Hudson and Essex counties and installed new superintendents in each. Nevertheless the Hague organization carried the two counties for Roosevelt and Edison by majorities of 100,000. In the inquiry into election practices, it was disclosed that Jersey City's poll books had been burned early in 1940. Republicans contended the destruction of the records corroborated their allegations, while Jersey City authorities maintained the burning of the poll books was legal, inasmuch as the law required only that they be preserved for two years. (A. J. S.; X.)

A significant political development in 1941 was the break between Governor Edison and Mayor Hague of Jersey City after the governor appeared before the Republican legislature in joint session and urged the adoption of the railroad tax bills. This legislation provided for a new method of taxing railroad property. It had been bitterly opposed by Mayor Hague who contended the legislation favoured the railroads unduly. Governor Edison acted upon the recommendations of a fact-finding committee which he appointed to resolve the long-standing controversy. He contended that the proposed system was equitable and that in prosperous years the state would reap larger returns than ever. The new laws did not end the litigation. Attorney General David T. Wilentz, supporting Mayor Hague, attacked the constitutionality of the laws in the court of chancery. The state treasurer, William Albright, was authorized by the legislature to engage counsel to defend its action.

During 1941 Governor Edison conducted a campaign to elect a Democratic assembly and to gain senate seats. He appeared in almost every county. The Hague organization remained aloof from the state fight, concentrating on the production of a huge "protest vote" in Hudson county against the railroad laws. The Hague candidates were elected overwhelmingly, and the Republicans retained control of the legislature by increased majorities in both

houses. The house was Republican by 43 to 17; the senate, Republican by 17 to 4. Apart from the accord on the railroad issue, the year was one of conflict between the governor and the legislature. The dispute had its origin in the refusal of the senate to confirm some of the governor's key appointees. On Dec. 22, 1941, the legislature revived an old law giving the governor wide powers to call upon the resources and personnel of the state in a war emergency. Under it the governor formed a war cabinet to expedite civilian defense measures and to extend the work of the state defense council. As another defense measure, a state guard, consisting of approximately 2,000, was equipped to replace the national guard.

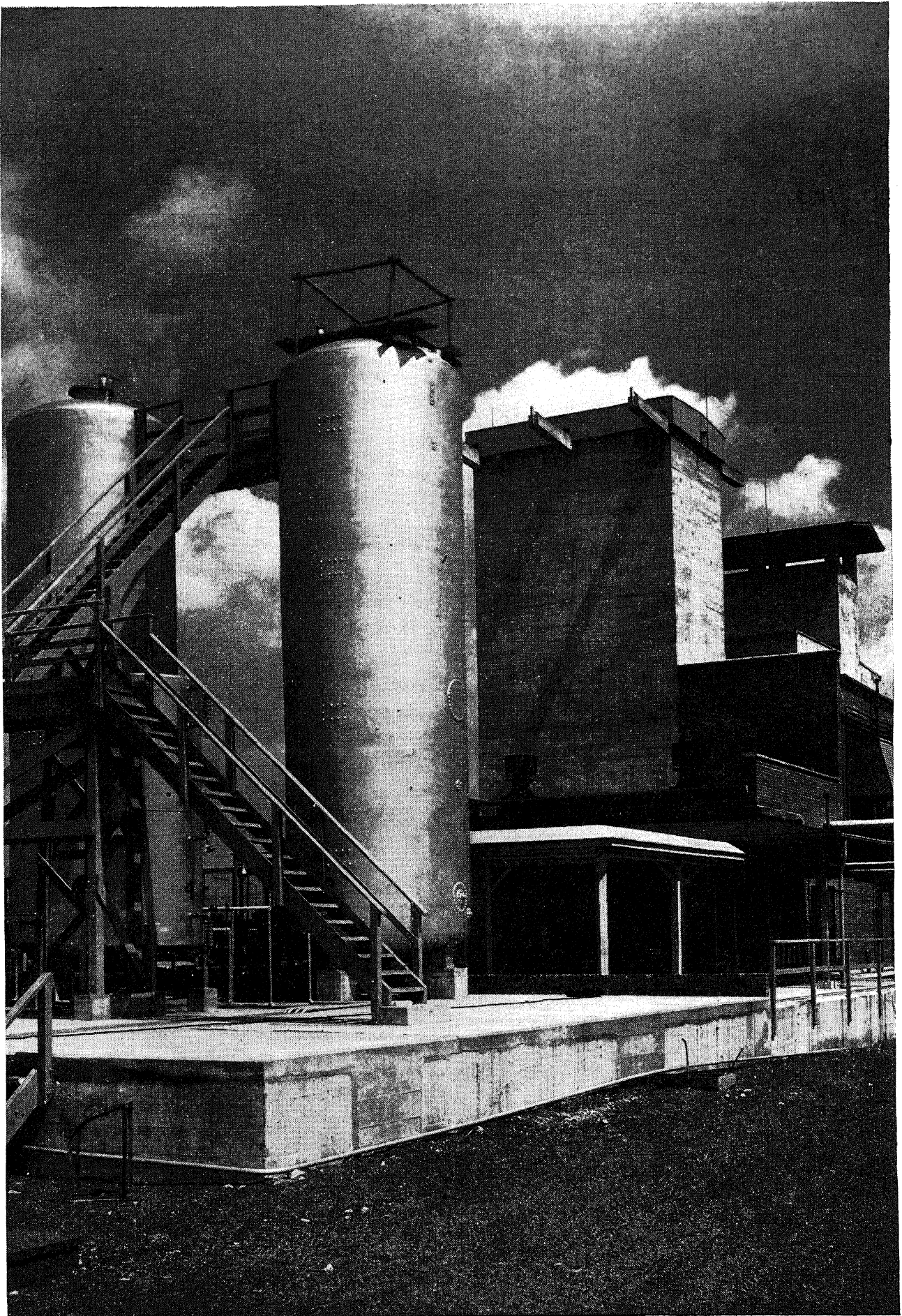
A resurgence of the Republican party in 1942 culminated in the election of Albert W. Hawkes to the U.S. senate. He defeated the incumbent Democrat, William H. Smathers, by more than 84,000 votes in a bitterly-fought contest. Smathers had the support of Mayor Hague and the endorsement of many leaders of organized labour, both C.I.O. and A.F. of L. He did not, however, have the support of Democratic Governor Edison, and this division in the party largely accounted for the Democratic defeat in the election. The Republicans picked up another seat in the house of representatives, thereby making the state's congressional delegation 11 Republicans and 3 Democrats, and won overwhelming control of the state legislature.

Throughout 1942 Governor Edison had striven unsuccessfully to advance the cause of constitutional revision. His crusade was generally supported by the state press, many civic organizations and speakers' bureaus. Mayor Hague's organizations opposed the plan, but the chief opposition originated in the state senate. Differences between the governor and Mayor Hague on the constitution marked only one aspect of their intraparty conflict. The governor early in 1942 ousted the Hudson county tax board, an important cog in the Hague machine, and appointed a new board which began immediately to reduce Hudson county assessments on the score that they were inflated and did not represent equitable valuations. Mayor Hague responded with renewed attacks on the governor as being instrumental in compromising railroad taxes long overdue, with accumulated penalties amounting to more than \$20,000,000.

The elections of 1943 completed the Republican conquest of major elective offices in New Jersey. Walter E. Edge was elected governor by a majority of 127,000 over Mayor Vincent J. Murphy, the Democratic nominee. The Republicans retained large majorities in both branches of the legislature, with 44 Republicans to 16 Democrats in the assembly, and 18 to 3 in the senate. The Democrats gained possession of a U.S. senate seat when Senator W. Warren Barbour's death left a vacancy to which Governor Edison appointed Arthur Walsh. The elections also marked the first step toward the adoption of a new constitution. A referendum was adopted by a majority of 154,000, directing the 1944 legislature to write a new constitution for ratification or rejection at the 1944 general election. The controversial railroad tax legislation was ruled unconstitutional in the court of chancery and an appeal from the chancery decision was taken immediately to the court of errors and appeals.

For the fourth consecutive time, President Roosevelt won the state's 16 electoral votes in the quadrennial elec-

Testing unit for high octane fuels maintained by the Standard Oil Company of New Jersey at Paterson, N.J. Petroleum refineries as well as other industrial equipment in the state underwent considerable expansion during World War II to meet production schedules



tions of 1944. The vote was: Roosevelt 987,874; Dewey 961,335. President Roosevelt's majority was insufficient to carry the rest of the Democratic ticket to victory. H. Alexander Smith (Rep.) was elected to the U.S. senate over Representative Elmer H. Wene (Dem.) to succeed to the seat held by Arthur Walsh (Dem.). The Republicans gained another seat in the house by electing a successor to Elmer H. Wene in the 1st district. The Democrats won in only two of the state's 14 districts. The legislature remained overwhelmingly Republican.

Of almost comparable importance to the presidential

election in 1944 was the referendum on a new constitution which the Constitutional Revision commission, a bi-partisan agency, had developed. The new charter provided for a new court structure, 90-day sessions of the legislature, increased salaries for senators and assemblymen, assessment of all property at uniform rates, required a three-fifths vote instead of a bare majority to re-enact vetoed bills, and would have given legislative committees wide investigatory powers to inquire into the official conduct of public officials. It was defeated by 127,000 votes. Mayor Hague and the regular Democratic organization, the state federation of labour and the C.I.O. opposed the new constitution. It was endorsed by the Republican state platform and had

Democratic support from former Governor Edison.

The chief political interest in 1945 centred in the legislative elections and the special election in the 4th congressional district. The Republicans continued their control of the legislature, winning 42 seats in the assembly as against 18 for the Democrats and 17 seats in the senate as against 4 for the Democrats. The 4th district election also resulted in a Republican victory that kept the state's congressional delegation Republican by 12 to 2. Primarily because of an intraparty fight among the Democrats, the Republicans elected Frank A. Mathews, Jr. to succeed D. Lane Powers. The campaign was enlivened by Democratic attacks on the state racing commission over the issuance of a licence for a race track in Middlesex county near Rutgers university. The application for the licence was withdrawn and as a result of the controversy the racing commission adopted a resolution petitioning the legislature to levy on the breakage—the odd pennies remaining in the pari-mutuel pools after each bet was settled—which for the 50-day season at Camden amounted to more than \$600,000. The commission also granted licences for two more race tracks, one at Long Branch and the other near Atlantic city.

The 1945 session of the legislature saw the enactment of the Fair Employment Practices act, a measure designed to outlaw racial and religious dis-

New Jersey: Statistical Data

Table I.—Education

	1938	1940	1942	1943	1944
School buildings	2,125		2,090	2,090	
Elementary school pupils	544,093	785,195	719,623	676,485	650,052
High school pupils	202,290				
Elementary teachers	17,686	28,640	29,513		27,237
High school teachers	9,201				

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Cases on general relief	66,952	74,900	61,900	48,138	26,539
Cost of general relief	\$1,663	\$1,860	\$1,389	\$1,065	\$589
Recipients of old-age pensions		27,332		31,145	31,174
Cost of pensions		\$528		\$645	\$666
Dependent children receiving aid		25,164		25,037	23,833
Blind receiving aid		599		720	739
Workers under unemployment compensation		839,620	883,814	901,800	

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Highway mileage		1,593		1,625	
Expenditure on highways		\$37,961	\$38,988	\$48,330	\$57,509
Railroad mileage		2,133	2,132	7,786	

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
State revenue	\$143,470	\$153,415	\$155,145		
State expenditure	\$107,496	\$114,435	\$8,074		
State gross debt	\$178,758			\$149,396	\$117,071
Number of banks	416	410	393	386	
Total bank deposits	\$2,030,700	\$1,985,300	\$2,046,400	\$2,147,800	
Number of natl. banks	229	229	226	225	
Deposits of natl. banks	\$767,027	\$782,598	\$872,643	\$945,285	

Table V.—Agriculture
(All figures in thousands)

	1937	1938	1939	1940	1942	1943 (est.)
Acreage, principal crops	768	732	724	734	793	800
Leading crops (bu.)						
Apples	4,876	3,531	4,252	3,354	3,239	2,262
Asparagus (crates)	1,155	1,718	1,960	1,875		
Barley	30	62	150	196	270	182
Corn	8,528	7,486	7,182	7,371	8,370	6,808
Hay	370	357	319	367	379	399
Oats	1,530	1,224	1,260	1,419	1,290	1,118
Peaches	1,651	1,172	1,435	1,494		
Potatoes	10,498	10,530	7,480	10,150	10,136	11,502
Tomatoes	2,275	1,800	2,185	2,035		
Wheat	1,462	1,342	1,170	1,316	1,175	984

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1942 (est.)	1944
Wage earners	436,745	433,471		
Wages paid	\$523,504	\$521,569	800,000	910,000
Value of products	\$3,253,426	\$3,428,947		
Leading products (value):				
Smelting and refining nonferrous metals	\$241,250	\$246,917		
Petroleum refining	216,284	213,963		
Motor vehicles	9,721	112,426		
Chemicals	177,139	192,185		
Shipbuilding	41,622	72,352		
Meat packing	84,014	78,095		

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1943
Total value mineral production	\$31,468	\$24,409	\$30,271	\$37,583
Leading products (value)				
Zinc	13,461	10,892	11,507	
Clay	6,910	5,594	7,249	
Sand and gravel	3,347	2,520	3,362	
Stone	2,621	2,679	3,037	
Iron ore	2,474	761	1,865	

crimination in government and industry; extension of unemployment compensation benefits to 26 weeks with a ceiling of \$22 per week; Rutgers university was given the status of a state university; and a state fund was created to finance returning veterans up to \$3,000 in the establishment of small businesses. (W. R. Ck.; X.)

In 1946, Alfred E. Driscoll, the Republican organization candidate, defeated former Governor Harold G. Hoffman in the June primary and in November was elected Governor of New Jersey over Judge Lewis G. Hansen, his Democratic opponent, by 122,000. Election of Driscoll was the first time the Republicans had held the Governor's office for two successive terms after 1909. The Republicans also increased their pluralities in the legislature, controlling the 1947 assembly by 48 to 12 and the senate by 16 to 5. Re-election of United States Senator H. Alexander Smith continued two Republicans in the senate from New Jersey, and the G.O.P. retained 12 of the state's 14 congressional representatives.

Legislation was passed in 1946 permitting the state government to seize and operate all public utilities in which service was interrupted or threatened by virtue of labour disputes, the first such legislation in the United States. As a result, when workers in nine gas production plants went on strike against utility management, the state took over and operated the plants successfully with their regular personnel. Later in the year other strikes in the same plants found the employees unwilling to work for the state, but under Governor Walter Evans Edge's direction full production was maintained and within a few days the men were back at work, the issues at stake going to arbitration.

Other legislation included repeal of the intangible personal property tax and its replacement by a net worth tax; initiation of two major north-south highways traversing the state, increased state road aid to counties and extension of the juvenile delinquency act to 18 years of age.

(W. E. EE.)

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New Mexico

Fourth largest state in the southwestern United States, popularly known as the "Sunshine state," New Mexico was admitted to the union in 1912. Area 121,666 sq.mi., including 155 sq.mi. of water. Population (1940) 531,818 (25.6% increase after 1930); rural 355,417, urban 176,401; native white 477,065, Negro 4,672, foreign born 15,247. Capital, Santa Fe (20,325). Other cities: Albuquerque (35,449); Roswell (13,482); Hobbs (10,619) and Clovis (10,065). On July 1, 1944, the bureau of census estimated the population of the state at 532,212.

In 1937 the administration of the state was Democratic. The chief officers were: governor, Clyde Tingley; lieutenant governor, Hiram M. Dow; secretary of state, Mrs. Elizabeth F. Gonzales; auditor, Jose O. Garcia; treasurer, James J. Connelly; attorney general, Frank H. Patton; superintendent of public instruction, H. R. Rodgers. The national representatives were Senators Carl A. Hatch and Dennis Chavez and Representative John J. Dempsey.

In 1938, John E. Miles (Dem.) was elected governor. Other state officers elected with him were as follows: lieutenant governor, James Murray, Sr.; secretary of state, Jessie M. Gonzales; auditor, E. D. Trujillo; treasurer, Rex French; attorney general, Filo Sedillo; superintendent of

public instruction, Grace J. Corrigan and commissioner of public lands, Frank Worden.

In the presidential election of 1940, Roosevelt received 103,699 votes as against 79,615 for Wendell L. Willkie.

Legislation of 1941 provided for airport zoning regulation, prohibition of liquor sales near army posts, permissive municipal slum clearance, the teaching of Spanish in the fifth to eighth grades under certain conditions, a public service commission, a board of examiners in the basic sciences for practising the healing art, and a state guard. The state merit system commission and legislative reference bureau were abolished. A special appropriation of \$750,000 was made for national defense to be expended by the state finance board.

The chief officers of the state elected on Nov. 3, 1942, were: governor, John J. Dempsey; lieutenant governor, James B. (Jawbone) Jones; secretary of state, Cecilia Tafoya Cleveland; auditor, J. D. Hannah; treasurer, Guy Shepard; attorney general, Edward P. Chase; superintendent of public instruction, Georgia L. Lusk and commissioner of public lands, H. R. Rodgers. U.S. senators were Carl A. Hatch and Dennis Chavez; representatives, Clinton P. Anderson and Antonio M. Fernandez. The administration, legislature and congressional representation continued to be Democratic.

Legislation enacted in 1943 included measures to equalize state employees' salaries; to forbid legislators to hold additional state jobs; to provide child vaccination against diphtheria; to permit limited child labour under the age of 16 during World War II; to create a state purchasing agent; and to levy a tobacco tax for needy aged people's support.

Principal state officers elected on Nov. 7, 1944, were: governor, John J. Dempsey; lieutenant governor, James B. Jones; secretary of state, Cecilia Tafoya Cleveland; auditor, J. D. Hannah; treasurer, Guy Shepard; attorney general, Clyde C. McCulloh; superintendent of public instruction, Georgia L. Lusk and commissioner of public lands, John E. Miles. The 1944 presidential vote in New Mexico was: Democrat, 81,389; Republican, 70,688.

In 1945 a juvenile court was established in each county in the state, a bounty was granted on predatory animals, and Aug. 3 was declared "Ernie Pyle day." John Bingham replaced Guy Shepard as treasurer of the state. Administrative, legislative and congressional officers continued to be all Democratic.

The chief officers of the state elected in the 1946 elections were: governor, Thomas J. Mabry; lieutenant gov-

New Mexico: Statistical Data

Table I.—Education (Public)

	1936	1938	1940	1942	1944
School buildings	927	1,280	1,143	957	908
Elementary school pupils	84,318	109,307	132,589	131,342	122,621
High school pupils	14,889	20,570			
Elementary teachers	2,682	2,982	3,798	3,743	3,687
High school teachers	750	727			

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Cases on general relief	2,507	1,645	2,192	2,148	1,759
Cost of general relief	\$18	\$9	\$15	\$15	\$12
Recipients of old-age pensions		3,811		4,483	4,750
Dependent children receiving aid		4,346		5,486	5,710
Blind receiving aid		199		233	218
Workers under unemployment compensation		42,591	39,053	46,200	

Table III.—Communications

(Money figures in thousands of dollars)

	1938	1939	1941	1942	1944	1945
State highway mileage	11,849	12,269	9,276	9,349	9,178	9,455
Expenditure on highways	\$11,567	\$9,798	\$8,702	\$7,601	\$5,904	\$4,468
Railroad mileage	2,862	2,844		2,692	2,583	2,583

New Mexico: Statistical Data (continued)

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1940	1942	1944	1945
State revenue . . .	\$24,227	\$24,981	\$23,904	\$32,230	\$34,890	\$35,356
State expenditure . .	23,281	15,446		32,869	34,907	35,858
State net debt . . .	15,243	21,426		24,621	22,031	20,477
State gross debt . . .	16,810		26,910	24,916	22,323	20,628
Number of banks . . .	41	41	41	41	41	41
Total deposits . . .	\$55,000	\$56,800	\$62,500	\$78,421	\$168,947	\$220,256
Number of natl. banks	22	22	22	22	22	22
Deposits of natl. banks	\$45,356	\$47,929	\$4,563	60,058	127,651	163,580

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1941	1943	1944	1945 (est.)
Acreage, principal crops . . .	1,474	1,417	1,548	1,542	1,783	1,313
Leading crops (bu.)						
Beans (bags)	681	504	1,078	768	724	238
Corn	2,740	2,552	3,315	2,930	3,510	2,400
Cotton (bales)	163	102	115	108	116	107
Grain sorghums	4,500	4,725	8,348	1,422	5,560	504
Wheat	3,139	3,782	2,735	2,405	3,186	2,328

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	3,683	3,250
Wages paid	\$2,992	\$2,913
Value of products	\$11,485	\$25,124
Leading products (value):		
Petroleum refining	\$3,431	\$3,539
Lumber and timber	4,945	2,757
Bakery products	1,606	1,756
Newspapers	1,212	1,457
Nonalcoholic beverages	870	1,209
Cottonseed oil	1,437	1,165

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
Total value of production	\$72,856	\$69,922		\$50,057	\$48,824	\$41,936
Leading mineral products (value):						
Copper	7,757	9,598	\$16,734	18,504	17,117	13,454
Potash			7,027	12,271	13,620	13,941
Coal	4,973	3,437	3,580	6,136	5,709	5,201
Zinc	3,111	3,053	6,156	10,056	9,193	6,451
Gold	1,441	1,294	500	76	125	150
Silver			940	239	256	242

ernor, Joe M. Montoya; secretary of state, Mrs. M. A. Romero; auditor, E. D. Trujillo; treasurer, H. R. (Ray) Rodgers; attorney general, Clyde C. McCulloh; superintendent of public instruction, Charles L. Rose.

(F. D. R.)

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New South Wales

New South Wales is a self-governing state within the commonwealth of Australia with such residual powers as not expressly transferred to the commonwealth by the Commonwealth of Australia Constitution act and other statutes. Area: 309,432 sq.mi.; pop. (1937 est.) 2,735,700; (1946 census) 2,925,600. Chief towns: Sydney (cap., 1,398,000); Newcastle (127,660); Wollongong-Port Kembla (44,000); Broken Hill (26,500). Language: English. Religion (1933 census): Anglicans 1,143,000; Roman Catholics 556,000; Presbyterians 258,000; Methodists 203,000; other Christians 123,000; nil or not stated 297,000. Governors: Lord Wakehurst (April 1937–March 1946); Lt.-Gen. John Northcott (after March 31, 1946). Prime ministers: Bertram Sydney Barnsdale Stevens (later Sir Bertram Stevens) (May 16, 1932–Aug. 5, 1939); Alexander Mair (Aug. 5, 1939–May 16, 1941); William John McKell (after May 16, 1941).

By 1937, the depression of the early '30s had passed and the last of the emergency economies imposed during the depression were lifted. Both unemployment relief payments and unemployed relief works were diminished and

normal public works expanded. State taxation was reduced and a balanced budget achieved. Concurrently the state government initiated a social betterment policy including a new scheme of social aid to rehabilitate and not merely relieve the residual unemployed; housing improvement and development of co-operative building societies; and extension of local government and of community services. In 1937 (after 30 years of dual systems) state living wage determinations were discontinued, and basic wage determinations of the commonwealth arbitration court were made applicable also to industrial awards under state jurisdiction.

A sudden and very heavy fall in world prices of wool late in 1937 and of wheat in 1938 followed by an unfavourable season caused a minor economic recession in 1938–39. Differences of opinion as to appropriate remedial measures arose between commonwealth and state and caused the shelving of plans for an active resumption of immigration, the state asserting that migrants could not be assimilated except under conditions of full employment.

The recession of 1938–39 with its financial and industrial problems led to political differences culminating in the resignation of the premier (B. S. Stevens, later Sir Bertram Stevens) on Aug. 5, 1939, after more than seven years in office. He was succeeded by Alexander Mair, leading a new coalition of the two parties which remained in office until it was defeated at the general election of 1941 by the Labour party under the leadership of W. J. McKell, who became premier on May 16, 1941, and was again returned at the general election of 1944.

Rates of state taxation, which had been increased in 1939, were again reduced in 1941, and in the early years of World War II a number of important civil measures were adopted, including the raising of the school leaving age from 14 years in 1941 progressively to 15 years in 1943, a scheme of pensions for aged coal miners in 1941, factory welfare measures and extended workers' compensation, and compulsory insurance of motor vehicles against third party risks.

But from the outbreak of World War II in Sept. 1939 the state government restricted its civil activities to the most essential functions and transferred many of its officers to war duties with the commonwealth or to organizations such as air-raid precautions instituted by the state as agent for the commonwealth.

In 1942 the state government legislated to transfer certain powers to the commonwealth for a period of five years for purposes incidental to the war and to postwar reconstruction. This legislation was inoperative because of the failure of some other states to enact similar laws. Referenda seeking to confer the relevant powers on the commonwealth were rejected by the electors in 1944. In 1942, also, all states refused assent to taxation proposals made by the commonwealth and the commonwealth government under wartime powers enacted a series of measures implementing a policy (known as "uniform taxation") whereby the commonwealth became sole authority for levying income tax for the period of the war. This raised constitutional controversy, culminating in an appeal by four states (not including New South Wales) to the high court of Australia, and resulted in a judgment which established that the commonwealth parliament had sufficient constitutional power to make laws which might enable it to continue indefinitely (if it so desired) as the sole authority levying income tax in Australia. Three years later (toward the end of 1945) the commonwealth government announced its intention so to continue, and in the following year enacted laws which provided *inter alia* an annual reim-

New South Wales: Statistical Data

Item	1938		1941		1945	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain		£A 1.25 = £1		£A 1.25 = £1		£A 1.25 = £1
United States		£A 1 = \$3.895		£A 1 = \$3.198		£A 1 = \$3.198
Finance						
State revenues	£42,659 (\$208,562)*		£47,506 (\$191,544)*		£58,892 (\$237,333)*	
State expenditures	£44,238 (\$216,282)*		£48,184 (\$194,279)*		£58,124 (\$234,238)*	
State debt	£282,161 (\$1,379,484)*		£292,654 (\$1,179,982)*		£281,750 (\$1,135,453)*	
Transportation						
Railroads		6,114 mi.		6,127 mi.		6,128 mi.
Highways		57,961 mi.		19,946 mi.†‡		...
Communication						
Telephones		244,590		280,161		320,198
Telegraph lines		32,743 mi.*		33,708 mi.*||		34,117 mi.*
Radio sets		431,159*§		492,304*		545,601*
Minerals						
Coal		9,570,930 tons		11,765,698 tons		11,528,893 tons¶
Silver, lead ore, concen- trates		317,230 "		...		249,484 "¶
Gold		88,698 oz.		88,091 oz.		63,779 oz.¶
Tin and tin ore		1,190 tons		...		1,074 tons¶
Zinc and concentrates		265,296 "		...		283,964 "¶
Crops						
Wheat		1,653,120 tons		717,990 tons		1,425,000 tons ¶
Hay		825,309 "		617,264 "		735,641 " ¶
Bananas		50,748 "		45,504 "||		39,226 " ¶
Oranges		2,336,178 bu.		2,131,705 bu.¶		2,251,293 bu.¶
Livestock						
Sheep		51,563,181§		55,568,000§		46,662,000§
Cattle		3,019,581§		2,769,061§		3,144,701§
Horses		528,625§		531,776§		436,443§
Swine		356,765§		507,738§		523,917§
Sea products						
Fish		14,691 tons		...		11,901 tons ¶
Oysters		4,126 "		...		2,569 " ¶
Crayfish		13,467 doz.		10,915 doz.¶		4,596 doz. ¶
Manufactures—Total	£67,550 (\$299,585)§	...	£104,623 (\$422,152)†	...	£123,274 (\$497,411)¶	...
Industrial metals, machines and implements, etc.	£25,251 (\$111,990)§	...	£47,644 (\$192,245)†	...	£62,235 (\$251,120)¶	...
Food, drink and tobacco	£12,833 (\$56,915)§	...	£16,059 (\$64,798)†	...	£16,993 (\$68,565)¶	...
Paper, printing and bind- ing	£5,209 (\$23,104)§	...	£5,991 (\$24,174)†	...	£6,386 (\$25,769)¶	...
Chemicals, dyes, explo- sives, paint, etc.	£5,094 (\$22,592)§	...	£7,115 (\$28,708)†	...	£7,655 (\$30,886)¶	...
Education						
State schools [□]		3,283		3,053		2,750¶
Enrolment [□]		383,025		359,694		333,317¶
Teachers [□]		11,668		12,047		11,228¶
Private schools		746		739		718¶
Enrolment		100,720		103,350		108,119¶
Teachers		5,060		5,213		5,049¶
Universities [□]		2		2†		2§
Enrolment		3,547		3,253†		4,533¶
Teachers		290		444†		461¶
Technical schools		22		26		...
Enrolment		30,865		40,983		...
Teachers		1,053		1,437		...

*Year ending June 30. †1942. ‡Figures incomplete. §1939. ||1940. ¶1943. ¶1944. ¶Year ending March 31.
[□]Includes figures for Australian Capital Territory. [□]Includes New England College governed by the University of Sydney.

bursement payment for an unlimited period to states that did not levy income tax, beginning with the fiscal year 1946-47. While the principle was not agreed to by the state, the basis of reimbursement was arrived at in conference between commonwealth and states. In the existing circumstances these laws and the system adopted precluded states from determining and levying income tax and made all Australia subject to one tax on income determined by the commonwealth parliament.

The period 1937-46 closed with the evolution of commonwealth-state financial (and other) relationships entering a phase in which the original conception of federation might be substantially modified. Despite state resistance to extension of commonwealth authority and unwillingness of the electors to give direct approval to major extension of commonwealth powers, the electorate had given both direct and indirect approval to extension of commonwealth control over governmental finance and had tacitly accepted its implications in regard to policy. Nevertheless, strong differences of opinion remained as to the desirable line of demarcation between commonwealth and state powers.

With the approach of the end of the war in 1945, the state revived its suspended policy of social improvement and economic development and plans for postwar reconstruction were adopted. In 1945 an act of parliament provided that two weeks' annual holidays with pay should be allowed to all employees; workers' compensation was again liberalized; the functions of the housing commission (set up in 1942) were expanded; measures for modern town

planning were enacted; regional planning and development were instituted; a state electricity commission was appointed to co-ordinate and extend electricity supply, and a ministry of conservation of soil and water was established.

Despite the rapid completion of demobilization, by Oct. 1946 full employment was maintained, but with a general shortage of labour, particularly acute in respect to women and juveniles. The state was collaborating with the commonwealth in measures to maintain full employment and to encourage immigration to relieve the labour shortage and promote development. (See also AUSTRALIA, COMMONWEALTH OF.) (A. W. S.)

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Newspapers and Magazines

The story of U.S. newspapers and magazines during the decade 1937-46 is so intertwined with social, political and economic events that it can scarcely be isolated for examination by itself. For these periodicals, whether looked at internally or externally, it was a decade of superlatives. As background for the story of publications, the decade was overshadowed by these aspects: (1) The decade brought a four-year war winding up a ten-year world war, involving the U.S.'s greatest war effort, with the largest

army, the largest navy, the largest air force; the greatest public expenditures, taxation and public debt; the largest war production, involving almost complete conversion of industry to war work; the greatest repercussions on civilian life, the largest war casualty list; and the adventure of fighting two wars on fronts thousands of miles apart. (2) There were unprecedented social, economic and governmental changes; as "the decade of the common man" it saw much labour unrest and continuing periods of strikes and controversies in many fields (in the newspapers, not only the International Typographical union of mechanical workers but also the guild of newsmen); it saw fundamental changes in the U.S. governmental system involving the growth of federal power at the expense of local and state government; it saw much experimentation with governmental social and economic controls—of wages and hours, price and production levels, governmental invasion of the smallest economic spheres; it saw the building of the greatest bureaucracy and the levying of federal taxes on a scale never before dreamed of. (3) The decade saw the longest presidential term in U.S. history, the last 9 years of the 12-year term of the first president to serve more than 8 years, violating the third term tradition and then the fourth, with consequent weakening of the opposition party and serious threat to the two-party system—since a generation grew up knowing only one president. (4) The decade brought the end of a serious depression which faded out—just as in 1898—into the artificial prosperity of war activity and ended in a threat of dangerous inflation. (5) There was popular adaptation of many new inventions, such as the radio, the aeroplane, universal dependence on the motorcar, new uses of the internal combustion engine even by railroads. (In publication offices it took the form of teletypes, telephotos, radio news and pictures, photo offset printing, new printing and engraving processes.) (6) The decade brought a revolution in rapid communication creating a smaller world—traversed in minutes and hours by radio and planes, instead of days and weeks. (To newspapers this meant radio and aeroplane transmission of news and pictures and competition of radio in the sale of news.)

The newspapers and magazines mirrored this superlative decade. In turn, they were vitally affected and changed by it. The story of their part in it is so complicated that it is difficult to unravel the trends or threads, to distinguish the internal from the external.

The Decade Summed Up Year by Year.—Considered chronologically, the decade for newspapers may be summed up by high spots thus: 1937—the financial problems of "the recession," the beginning of rising wages and paper prices and the first flurry of guild strikes; 1938—Munich and the first try-out of the new foreign news-gathering machine; 1939—war news and increasing foreign coverage; 1940—expanding war, the selective service lottery and a presidential campaign involving the third term; 1941—war news stepped up by entrance of the United States in December; 1942—shortages of manpower and materials, conflicts with governmental agencies, all resulting from conversion of industry to war; 1943—paper shortage becoming serious, circulations rising, and editors worrying over restraints and threats to press freedom; 1944—a presidential campaign, war fronts spreading out thousands of miles; circulations rising to an all-time peak in spite of paper shortage; 1945—coverage of the ends of two wars around the world from each other, and later the beginning of reconversion and labour strife; 1946—paper shortage plus

rising prices, return of veterans to the offices, an era of strikes, and frantic efforts to check inflation that resulted from war savings versus lack of consumer goods.

U.S. Newspapers and World War II.—The citizens of the United States witnessed and enjoyed during World War II the best, quickest, most thorough and most accurate all-time news coverage of a war. Newspaper coverage of World War II was strikingly different from that of World War I. The outbreak of war in 1914 had caught U.S. newspapers almost completely unprepared; they had almost no foreign news-gathering organization because they had been getting their European news through exchange with British, French, German and other foreign news agencies—with all the implications of censorship, propaganda and government control that involved. As wireless was in its infancy and radio had not been invented in 1914, newspapers were dependent on cable transmission—so that, when the British cut the German cables, U.S. newspapers were restricted to the British version of the war, with only dribbles of news from Germany. Lacking a co-operative foreign news machine then, newspapers differed greatly in war coverage, and exclusive news beats were common. Dissatisfied with the sorry foreign news situation in 1914–18, U.S. newspapers cancelled their exchange relationships with foreign agencies and set out to build a foreign news machine manned by hundreds of U.S. citizens stationed abroad as correspondents; newspapers did the job not as individuals but co-operatively through their press agencies—the Associated Press, the United Press and International News Service—so that all the news became equally available to even the smallest daily. The first threats of hostilities in the middle '30s found the newspapers well prepared; in fact, the news machine gave warnings of war long in advance.

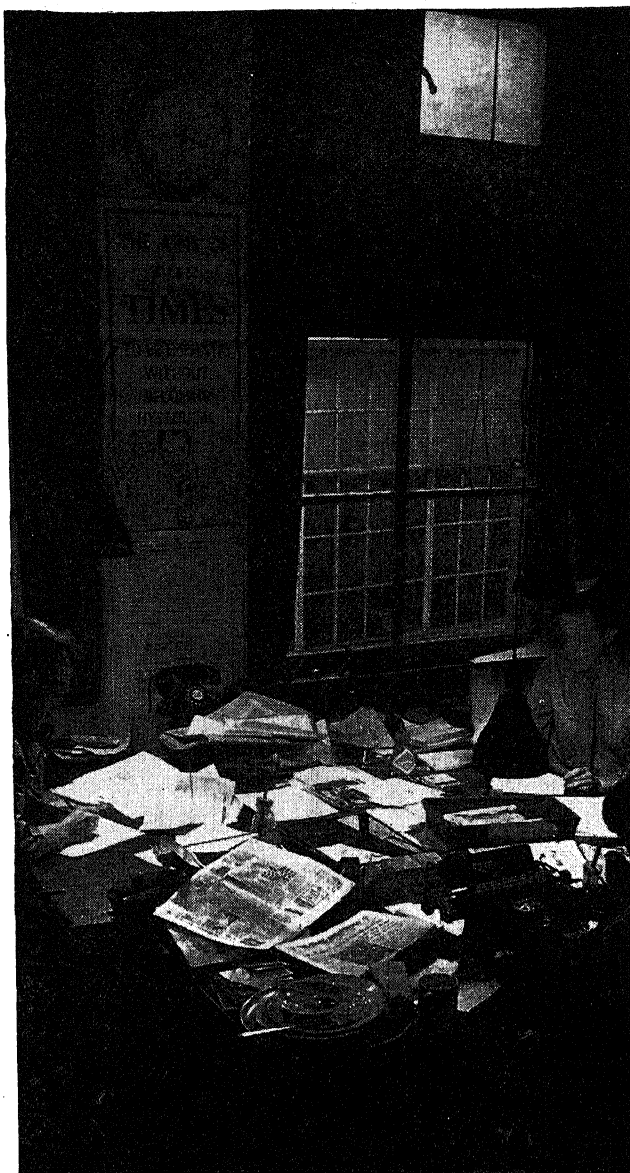
The first real test of this foreign machine, after 20 years of building, was the Munich conference in Sept. 1938. On that one event, Associated Press sent 557,544 words by cable and radio telephone, ranging from 10,000 to 25,000 words a day and reaching 31,174 words on Sept. 26, as well as 80 radio photographs costing \$90 each; other services attained similar totals, and the story was handled by the largest group of correspondents ever assembled. The huge cost was borne co-operatively by the entire daily press. Through 1939, during "the war of nerves," the news machine functioned effectively from news centres in London, England, Paris, France, and Amsterdam, Neth.; it was weak only in the U.S.S.R., the Balkans and eastern Europe, where censorship checked accurate reporting. The number of correspondents ran into the hundreds, daily files ranged from 25,000 to 40,000 words for each service and daily costs rose to \$6,000, resulting in assessments of 15% to 25% on U.S. newspapers. Cable crowding shifted the news centre from London to the United States so that France received its war news from New York via wireless. When Germany invaded France and the Low Countries in May 1940, Adolf Hitler's armies swept out the U.S. news machine, and from then through 1941, U.S. war reporting was greatly handicapped, being forced to clear through Berlin, Germany, Rome, Italy, and Vichy, France, under severe censorship and controlled communications set up by the propaganda machines of the dictators. Reporting became a matter of weighing communiqué against communiqué, but even Great Britain received its best war news from New York. Costs for each of the press agencies ran above \$1,000,000 a year, and daily cable and wireless tolls of \$5,000 were usual.

Formal U.S. entrance into the war in Dec. 1941 caught scores of correspondents in Germany, Italy, Japan and

China, and they were interned along with diplomatic corps. Through 1942 and later, with the U.S. facing two enemies, the correspondents trooped into the Pacific; their activities spread all over the world as they joined the fighting men in planes, tanks and warships. During the invasion of Africa, Sicily and Italy in 1942-43, not only were the correspondents with the troops, but a press mobile wireless transmitter went along to send their reports to New York; meanwhile newspaper men went ashore with the troops who were retaking Pacific islands from the Japanese. During the peak of the two-front war in 1943, so many correspondents were killed that newsmen were ordered not to take unnecessary risks, while others added to their glory by "keeping the secret" of military movements and of the journeyings of President F. D. Roosevelt to conferences at Casablanca, Cairo and Tehran. With the invasion of Normandy in June 1944, some 450 newsmen went ashore with the troops; shortly a press mobile transmitter, reporting to New York, was trailing close behind the tanks as they drove the Germans out of France. Meanwhile, 100 correspondents and a mobile transmitter were facing the risks involved in the recapture of Leyte and Luzon, in the Philippines. Newspaper men called 1944 "the biggest headline year in history," but "the week of weeks" was in 1945—April 28 to May 4, when the headlines read "Munich Revolts," "Mussolini Killed," "Reichstag Seized," "Hitler Suicide," "Italy War Ends" and "Hamburg Falls." With the ending of the two wars in May and August 1945, respectively, the news machine was pitched to such high speed that it could not await the slower official announcements but "jumped the gun" on the "final peace flash" of both wars—just as United Press had done in 1918—although it had "kept the secret" of the atomic bomb until President Harry Truman announced the Hiroshima raid from his ship in the Atlantic.

Watching a War Blow by Blow.—In retrospect, the operation of the U.S. news machine was as miraculous as the mobilization of U.S. production and military resources; no other nation had ever seen anything like it, and no newspaperman had even dreamed of it in previous wars. The result was that people of the U.S., through newspapers and radio, watched World War II as no people had ever watched a war before, from ringside seats, noting and discussing the fighting blow-by-blow, shot-by-shot, sometimes only a few moments after the fighting men saw the event. One Sunday afternoon all the U.S., sitting before radio sets, "watched" a German pocket battleship go to destruction in a South American harbour; on another they "saw" the Jap bombs falling on Pearl Harbor—as if through binoculars. There were errors and false alarms; censorship and propaganda at times clouded the picture before they cancelled each other; but largely the report was complete, accurate and amazingly rapid. Throughout, the activities of newspapers and radio were so co-operatively linked that it was impossible to assess proper credit to either. But it may be said that, although the U.S. had to wait until the writing of the history books to learn all the facts of World War I, the history books of World War II could be written from the newspaper and radio files.

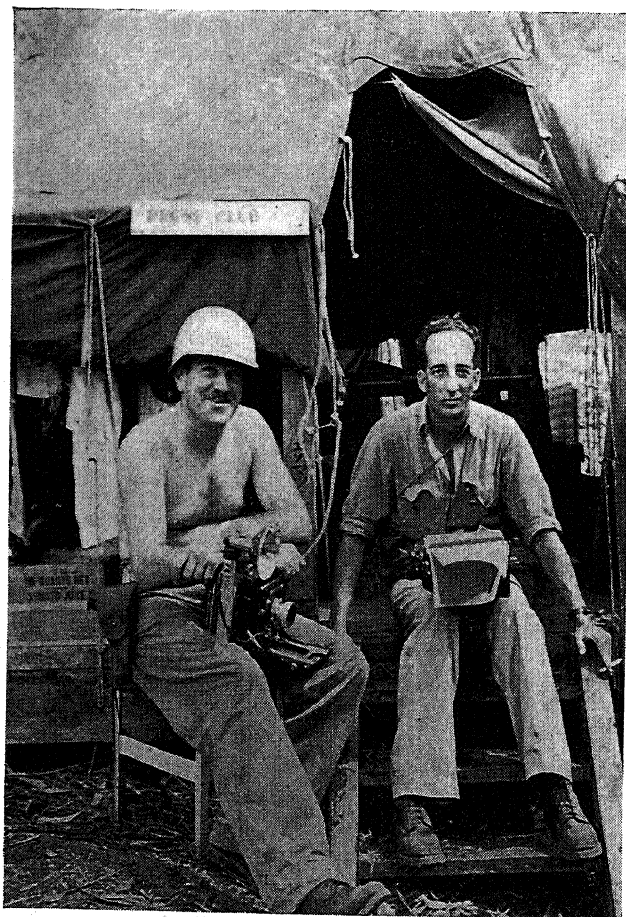
Use of New Devices.—New tools and processes were largely responsible for the news coverage of World War II. Radio and wireless almost put the cable into the discard. Air transportation of reporters, copy and pictures reduced time and distances. The telephoto, first by wire and cable, later by wireless, brought battle pictures right along with the copy. But three new operations were most responsible: (1) the concentration of all news-gathering efforts in the three press agencies, A.P., U.P. and I.N.S., and the pooling



Staff workers at the news desk of *Stars and Stripes*, the U.S. army's European daily, in the offices of the *Times* of London

of all their efforts; (2) the development of the 400-watt mobile radio transmitters, financed by Press Wireless—an organization of 65 newspapers and 3 press agencies—which trailed the armies in Africa, Italy, France and the Philippines, and provided independent transmission of 16,000,000 words of news that would otherwise have been delayed or crowded off the cable and wireless kept busy by the military; (3) the development of the public relations corps in the army and navy, together with the marine corps "combat reporter" group. Organized originally in 1940 to sell selective service to the U.S. public, the military public relations activities were extended during the war to a degree that was of great assistance to the newspapers, besides publishing 600 army post newspapers for the fighting men.

The printing of overseas editions by newspapers and magazines was a new wartime phenomenon. A Hawaiian edition of the *Chicago Tribune* was started in Dec. 1944, with plates flown over. At least 27 magazines printed lightweight editions for aeroplane delivery abroad, including *Time*, *Newsweek* and *Reader's Digest*. The *New York Times Overseas Weekly* was issued in 1945 in Manila, P.I., and ten other foreign capitals. In 1945 *Chicago Tribune* overseas editions appeared in Manila, Bremerhaven,



U.S. newspapermen outside the "Press Club" on Guadalcanal in the Solomon Islands in 1942

Germany, and Tokyo, Japan. The Paris edition of the *New York Herald Tribune*, suspended June 12, 1940, was resumed in Dec. 1944.

Free News Thwarts Press Control.—Censorship and propaganda did not prove to be the great evil that had been feared. By 1938, people of the U.S. had developed immunity against the propaganda of the dictators and laughed at it; and early in the war they discovered that censored communiqués from both sides, taken together, showed the truth between them; they learned that free communication with both belligerents disarmed censorship. The deportation in March 1941 of the heads of the Nazi Transocean News service operating in New York silenced one of the most active foreign propaganda voices. At times the U.S. army and navy were criticized for holding back the news—especially bad news—but newspapers defended such efforts to keep information from the axis. Strikingly, the United States did not repeat its 1917 plan of information control, but devised a new one.

Instead of imitating the Committee on Public Information, which had handled both censorship and propaganda during World War I, congress in 1941 separated the two functions into the bureau of censorship under Byron Price and the Office of War Information (OWI), later under Elmer Davis. Price, executive news editor of the Associated Press, was appointed director of censorship on Dec. 16, 1941, and was given drastic powers by congress on Dec. 17, but he immediately announced that censorship would be voluntary so long as newspapers and radio stations co-operated.

He gave out lists of news items, including weather forecasts, that should be withheld to avoid giving aid to the

axis, and the newsmen not only co-operated heartily but set up local agencies to enforce the plan.

As a result, there were no important conflicts or violations, and Price never used the drastic powers he had. The *Chicago Tribune*, which on Dec. 8, 1941, had dropped its policy of criticizing the war activities, was summoned before a federal grand jury in Aug. 1942 on the charge that one of its reporters, Stanley Johnston, had divulged confidential navy information in his report of the battle of Midway, but no indictment was returned. In Oct. 1943 the ban on newspaper and radio weather forecasts was removed, and in Dec. 1943 Price greatly liberalized the censorship code. He cut back his activities to a minimum in May 1945 and closed his office on Aug. 15, 1945. The OWI had a stormier career, because many in the newspaper profession opposed the imitation of dictator propaganda methods. They welcomed the reorganization under Elmer Davis in July 1942 and co-operated throughout that year. Conflicts arose in 1943, and in June congress reduced OWI domestic activities so that Davis closed 62 regional offices and dismissed 794 writers. He also created a newspaper advisory group and urged release of more official war news. In September he startled the country with a series of "horror pictures" of army casualties. In June 1944 OWI sent 450 writers to help cover the Normandy invasion. On Sept. 5, 1945, OWI was transferred to the state department, and Davis resigned shortly to return to the Columbia Broadcasting system as news commentator. Later, in 1946, some discussion arose over the refusal of A.P. and U.P. to have their news services used in a postwar foreign short-wave propaganda service similar to that of OWI during the war.

(See also CENSORSHIP.)

Editors' Fear of Press Restraints.—Related to censorship was some discussion of growing wartime controls by government. Almost every newspaper meeting of 1943 had "freedom of press" as its central theme, and various groups appointed special free press committees. A flurry resulted from limitation of press coverage of the United Nations Food conference in Hot Springs, Va., in March 1943. Again in 1944, argument arose over the United Nations Monetary conference in Bretton Woods, N.H., in July, and the Dumbarton Oaks peace meeting in August, but the United Nations conference in San Francisco, Calif., in the spring of 1945 freely admitted a large gathering of newsmen. Another aspect of censorship was the pride that newspapers took in keeping the secret of war activities widely known to them, even when released in advance: the Casablanca meeting of Pres. Roosevelt and Winston Churchill in Jan. 1943 was kept secret 32 hours; Roosevelt's southern trip of April 1943 was not mentioned although the silence embarrassed newspapers in cities that he visited; the meetings of Allied leaders in Cairo and Tehran in Dec. 1943 were kept secret although released in advance and broken by Reuters and Tass agencies abroad; the greatest secret of all was the development of the atomic bomb, which was widely known to newsmen but kept secret until Hiroshima in Aug. 1945.

All in all, the war saw surprisingly little conflict between government and the press. Although in Dec. 1941 congress revived and strengthened the old Espionage act and Trading with the Enemy act of World War I, there were no prosecutions, because there was no subversive press opposed to the war, like the Socialist press of 1917-18. Also there was no "jingo press" urging the U.S. into the war before Pearl Harbor; in fact, the press was united in warning against entrance into the war until the Japs forced the issue.

Death of 38 Correspondents.—The real drama of the newspaper coverage of the war was provided by the hundreds of correspondents—writers, photographers, radio men—who shared the dangers and hardships with the fighting men. In all, there were at least 600 to 800 of them, including 24 women, and their war dispatches through the press agencies alone totalled 270,000,000 words—exclusive of specials and independent writing. The rate of casualties among them was 22%, as against the 5% among fighting men. Their casualties, beginning in 1940, were totalled at the end of the war as 149, including 38 writers and photographers killed and 36 awarded the Purple Heart. Through 1942, the casualties included 10 killed, 33 wounded, 2 missing and 65 captured, of whom the Japs sent back 26 on the S.S. "Gripsholm"; 1943 added 5 more dead, 36 more wounded, 28 prisoners, 3 decorated, and 11 Liberty ships named after correspondents; 1944 raised the totals to 27 dead, 106 injured, 3 missing, 21 Purple Hearts and 6 other decorations. Most notable among the casualties were: Webb Miller, United Press European news manager, mysteriously killed near London in 1940; Ralph W. Barnes, *New York Herald Tribune*, killed in a bomber crash in Yugoslavia in 1940; J. B. Powell of Shanghai, rescued in 1942 but permanently crippled by Japs; Larry Allen, daredevil A.P. man captured at Tobruk in 1942; Vern Haugland, A.P. man rescued after 47 days' wandering in the New Guinea jungle following a plane crash; Raymond Clapper, columnist killed in a Pacific navy plane in 1944; Ernie Pyle, popular war columnist, killed

on Ie island, April 18, 1945. The most famous war picture was taken by Joe Rosenthal of A.P., showing marines planting their flag on Mt. Suribachi, Iwo Jima (see p. 332). By 1943, returned correspondents had published more than 100 "I seen it" books, and many were earning from \$100 to \$2,500 each for public lectures.

Newspaper Civilian War Activities.—No one knows how much newspaper space, energy and money went into the promotion of civilian war activities, but anyone who attended publishers' meetings during the war might have concluded that more was devoted to those tasks than to news coverage or to the financial job of keeping newspapers alive. At the end, it was announced that newspapers had printed \$130,635,459 worth of free advertisements for war bond sales, including 110,230 appeals totalling 78,000,000 lines—either printed free by the newspaper or solicited from business men. To Oct. 1945 newspaper carrier boys had sold 1,704,000,000 ten-cent war stamps—10% of all sold after Pearl Harbor. The first big war job was the costly news task brought by the draft lottery that initiated selective military service in 1940; even in the smallest newspaper office the staff helped local draft boards in assembling, sorting and publishing the lists. When the lottery affecting 17,000,000 men was held in Washington

Ernie Pyle, most famous of U.S. war columnists, with a group of marines during a brief lull in the battle of Okinawa. Pyle was instantly killed by Japanese machine gun fire on Ie Jima, April 18, 1945





on Oct. 29, the press agency wires devoted 17½ hours to carrying the 9,000 lottery numbers; then the news rooms correlated them with local lists and published many pages of names and numbers. Their reward was a temporary circulation gain of 25%. In 1941 the plan of enlisting newsboys as salesmen of defense stamps, started by the *Philadelphia Bulletin*, enrolled 1,000 newspapers and 500,000 carrier boys. By 1942, newspapers were devoting thousands of columns to such civilian war drives as air-raid precautions, civilian defense, sales of war bonds and stamps and rules of rationing and price control. A national scrap-metal drive, started by the *Omaha World-Herald*, collected 60,000 tons in Nebraska, then resulted in 16 newspaper leaders being enlisted by the War Production board to collect 4,000,000 tons; the drive netted 5,364,415 tons but cost 280,000 columns of free space. A common newspaper service was to send free subscriptions to local men in service. Some 300,000 carrier boys sold 547,188,878 war stamps in 1942 alone.

The Bankhead bill introduced into the senate in 1943 proposed to spend \$30,000,000 on newspaper advertisements of war bonds, but, while most weeklies favoured it, most dailies opposed it; it was finally shelved. After heavy support of the First War Loan in 1942, the newspapers carried 73,938 free ads, worth \$4,564,279 on the Second Loan in May 1943, and double that amount for the Third Loan in September; of these, newspapers donated 40% and merchants 60%. In August 1,600 newspapers in 27 states joined in a drive to urge farmers to cut 2,500,000 cords of pulpwood for war uses of paper and cartons. In November 1,100 newspapers co-operated to collect 8,000,000 tons of wastepaper. The war bond drives of 1944, the Fourth in March, the Fifth in August and the Sixth in November, were supported by more than \$400,000,000 in free advertisements in newspapers and magazines; some 9,600 newspapers used the treasury department mats. The Red Cross drive of 1944 enlisted another huge newspaper campaign. The greatest fund drive of all was the Seventh loan in the fall of 1945, and the sum of the free ads climbed to \$42,635,459. Behind these more concrete drives was a continuing educational effort through newspaper copy to guide the public in gasoline rationing, tire saving, travel limitation and the multitude of civilian responses to the war effort. Most newspaper groups abandoned their meetings in the spring of 1945 to save travel.

No very accurate record was kept of the newspaper contribution of manpower to military service. By Aug. 1941 the draft had taken 1,613 news and advertising men; by March 1942 the number was said to be 7,000. Occupational deferments were available, but few newspapers favoured them. The chief victims of the manpower shortage were weekly newspapers and small print shops, of which perhaps 10,000 out of 43,000 were forced to close. Meanwhile, women invaded the news staffs and publishing plants as never before, and newspapers urged schools of journalism to set up "accelerated programs" to make more available. Women acquired the nickname of "paper dolls" as the number of women in the congressional press gallery rose from 42 to 135; the United Press had women managers in 11 of its 66 domestic bureaus, and 81% of the students in journalism schools were women. In Oct. 1943 some 822 dailies reported 156 former employees killed in service, and about 40,000 employees in the army or navy.

By the spring of 1946, the veterans were flocking back to the jobs that had been held for them in newspaper offices, and the situation was returning to normal.

False Alarms.—The four "false alarms" of World War II were: (1) on June 3, 1944, three days before D-day of the Normandy invasion, an Associated Press girl teletype operator practising her signals in London transmitted a false invasion report which made a few editions; (2) six newsmen were suspended by the army for a jubilant uncensored broadcast over Radio Paris on Aug. 25, 1944; (3) on May 7, 1945, Edward Kennedy of the Associated Press sent a premature announcement of the German surrender at Reims one day ahead of the official government release; (4) following a false peace rumour from the San Francisco conference on April 28, the United Press on Aug. 12 carried a "false flash" prematurely announcing Japanese surrender, but only radio carried it—an extensive search failed to discover how it got on the teletype network.

After the war was over, many newspaper war news activities continued. To impress on U.S. minds the picture of nazi atrocities, the war department took 17 newspaper and magazine editors to Germany in April 1945 and their eyewitness accounts of the murder camps flooded the press with many atrocity photos. At least 1,800 newspaper and radio reporters attended the United Nations conference in San Francisco, Calif., April 25–June 26. The *New York Times* devoted a 16-page supplement to the entire 130,000-word Pearl Harbor report. The Nuernberg trial of German war criminals opening on Nov. 20, 1945, and extending well through 1946, drew a gallery of 325 correspondents including 100 Americans.

Opposition to Roosevelt.—Persistent conflict between the U.S. daily newspapers and the White House coloured the decade until the U.S. entry into the war late in 1941. Although Franklin D. Roosevelt started in 1933 with "a good press," he lost much of his newspaper support early in his first term—partly because the majority of the dailies were Republican, partly because many editors considered much of his New Deal was demagoguery, and partly because his behaviour in his press conferences antagonized many Washington correspondents. The opposition was seen much more in the editor's domain than in the publisher's office. The conflict was much misunderstood and misrepresented, because the limelight was centred on a few metropolitan Republican newspapers which persisted in opposing him while he was being elected largely by voters in their large cities; whereas in the smaller cities, where most of the dailies were published, all surveys showed a close correlation between newspaper attitudes and voters' behaviour. Probably the most striking aspect of the controversy was the evidence of the great change in U.S. newspapers in the previous half century—through the disappearance of the party organ newspaper. The result was the strange phenomenon of a newspaper opposing Roosevelt on its editorial page, but on its news pages giving such a fair and complete picture of his actions and policies that the voters re-elected him. During his several campaigns, newspaper men boasted that they had attained the ultimate in equal and fair news coverage for both candidates. Only a few newspapers, like the *Chicago Tribune*, fought him with every page.

Probably the most authoritative survey of daily newspaper support was made by the *Editor & Publisher* in 1946, when it obtained from 1,324 daily newspapers, representing 75.6% of the total number and 87.6% of the circulation, statements of their editorial page attitudes in his

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Raising the flag over Mt. Suribachi, Iwo Jima, in Feb. 1945. This outstanding photograph by Joe Rosenthal of the Associated Press was awarded first prize for war news and feature pictures in the *Britannica Book of the Year* photography contest for 1945

four elections. The survey showed: in 1932, Roosevelt was supported by 38.7% of the dailies, Herbert Hoover by 55.5% and the other 5.8% were neutral. In 1936, some 34.5% supported Roosevelt; 60.4% supported Alf Landon and 5.1% were neutral. In 1940 (the third term election), only 20.1% supported Roosevelt; 66.3% aided Wendell L. Willkie and 13.6% were neutral. In 1944, Roosevelt had 22% of the dailies, representing 17.7% of the circulation; Thomas E. Dewey had 60.1% of the dailies and 68.5% of the circulation; the remaining 17.9% of the newspapers with 13.8% of the circulation supported neither. The rise in neutral newspapers was seen mainly in the south.

To some extent, U.S. newspaper attitudes toward Roosevelt reflected the impact of New Deal measures on the newspaper business. The Newspaper Guild, which started in 1934, grew out of the National Industrial Recovery act and the Wagner act. Many editors blamed Roosevelt for the "recession" of 1937. The Wages and Hours act of 1938, with its five-day week, was difficult for six-day newspapers, especially smaller ones. The new tax laws, the security levy and the pay roll deductions greatly increased bookkeeping. Federal bureaus, setting the minimum working age at 18, threatened the "little merchant" carrier-boy system of which newspapers were proud. Limitation of truck mileage during gas rationing handicapped newspaper bulk delivery which depended little on rail carriage. The New Deal and Roosevelt consistently favoured radio, and from 1941 to 1942, Federal Communications commission hearings badgered the newspapers that owned 249 of the 838 radio stations. Finally, the 1,285 newspapers that belonged to the Associated Press resented the lawsuit brought against their organization in 1942 by the federal department of justice. In all these things, the small newspapers were more disturbed than the large ones.

Two Elections.—The coverage of the two presidential campaigns during the decade resulted in more newspaper activity than during any previous elections. In 1940 the extended whirlwind campaign of Wendell L. Willkie, including almost hourly extemporaneous talks in addition to prepared speeches, was one of the most difficult ever reported. Near the end, when both candidates spoke almost daily, their words swamped the wires and newspaper pages. But whatever the editorial pages said, few front pages failed to report every important utterance of either contestant. On Nov. 5 newspapers threw their entire facilities into recording and tabulating the 50,000,000 ballots so that the outcome was announced by 10 P.M. and the newspapers co-operated fully with the radio in getting the returns to the public. (Figures on press support announced by *Editor & Publisher* in 1940 differed slightly from the 1946 figures quoted above because fewer newspapers responded.) In 1944 all records for press coverage of presidential conventions were broken by 900 newspaper and 150 radio men at the Republican convention in Chicago, Ill., on June 26 and by a press gallery of 778 at the Democratic convention in the same city on July 15. While President Roosevelt made no extended trip, more than 100 reporters accompanied Governor Dewey on a 6,700-mi. campaign tour, and 80 were on his special train when it was wrecked near Portland, Ore., on Sept. 19. The gathering of election returns from 130,353 voting precincts on Nov. 7 was complicated by 4,000,000 absentee soldier ballots; Associated Press alone used 65,000 persons and 285,000 miles of leased wire.

Associated Press Trial.—The newspaper legal battle of the decade was the antitrust suit against the co-operative

Associated Press, filed in 1942 by the federal department of justice. The case was in the courts for three years—reminiscent of the Chicago *Inter Ocean* suit which caused the dissolution of the old Western Associated Press and the incorporation of the Associated Press in 1900. The controversy grew out of the founding on Dec. 4, 1941, of the *Chicago Sun* to contest the morning monopoly of the *Tribune* and supposedly to support President Roosevelt's New Deal against the opposition of Col. R. R. McCormick. Although receiving its wire news from the United Press, the *Sun* early in 1942 applied for membership in Associated Press presumably to obtain its wirephoto service, and the *Tribune* exercised its right of protest as a member in the same local field. After hints of a federal suit, the A.P. on April 20 revised its by-laws to revoke the famous right of protest and to liberalize membership rules, but at the same meeting voted 684 to 287 against admitting the *Sun* (hinting resentment at government threats) and also voted down the application of Eleanor Medill Patterson's *Washington Times*. The justice department filed the suit on Aug. 28, charging A.P. with being a monopoly and citing the refusal of the *Sun*. The A.P. responded on Oct. 27, protesting that the suit would create a monopoly by destroying its competitors, the United Press and the International News Service, and would convert A.P. into a public utility to be regulated by government, in violation of the constitutional guarantee of the free press. On Oct. 29 the *Chicago Tribune* filed a separate answer, and later some 1,000 smaller newspaper members organized to file a third answer. On Jan. 7, 1943, three judges of the U.S. circuit court of appeals of New York—Judges Learned Hand, Augustus N. Hand and Thomas W. Swan—were named an "expediting court" for the case. At a special meeting on Feb. 9, the A.P. further eased its by-laws on admission of members. During the next six months the government presented 545 questions of fact and A.P. presented 40 questions—piling up a record of more than 2,000,000 words. Both sides agreed on May 29 to a summary judgment based on written evidence, filed their lengthy briefs and on July 8 argued the case in court. The majority opinion in the court's two-one decision, handed down on Oct. 6, stipulated revisions in A.P. admission rules to avoid the charge of "monopoly." Judge Swan dissented. The government filed its "proposed judgment for the court" on Nov. 12. During December various newspaper spokesmen urged A.P. to appeal the case, rather than file an answer, arguing that the decision tended to violate the sanctity of property rights in "copy." On Dec. 15 the *Sun* again applied for membership. The A.P., however, filed its answer on Jan. 3, 1944, and the court's final judgment on Jan. 13 stipulated radical changes in A.P. by-laws. Five days later A.P. decided to appeal; on March 9 the lower court granted the appeal; and on May 8 the U.S. supreme court accepted jurisdiction. Briefs were filed on Oct. 23 and Nov. 6; oral arguments were heard on Dec. 5-6; and eight justices took the case under advisement. The A.P. finally lost the case in a five-three decision of the supreme court handed down on June 18, 1945, reaffirming the Jan. 13, 1944, ruling of the lower court; each of the eight justices wrote a separate decision, totalling 22,000 words. A.P. directors on Sept. 7 filed a petition for rehearing but this was denied on Oct. 8, and a stay of 120 days was set for compliance. At a special meeting on Nov. 28, some 125 A.P. members with 948 proxies, revised the membership rules to conform, voted 949-34 to admit the *Sun* as an associate member (all it asked for), and voted 962-23 to admit the *Washington Herald*. (Col. McCormick seconded the motion to admit the *Chicago Sun*.)

The three-year legal battle had cost \$234,592 and left the A.P. with no recourse except appeal to congress to amend the antitrust law so as to further exempt co-operatives.

Other Legal Fights.—Another notable legal struggle concerned the magazine, *Esquire*, which Postmaster General Frank C. Walker in 1943 wished to bar from the mails on the charge of obscenity (the Varga nudes). After lengthy hearings, the postal board voted 2-1 to drop the charge, but on Dec. 30 Walker annulled *Esquire's* second class postal privileges, effective Feb. 28, 1944, on the grounds that the magazine was "not devoted to useful information" worthy of mail subsidy. After a court fight started in June and extending through the year, the U.S. court of appeals in June 1945 returned the second class rate to the magazine. The only other notable legal battles during the decade were a series of cases in which judges cited newspapers for contempt of court as the result of criticism of court verdicts: In 1940, the *St. Louis Post-Dispatch* and the *Los Angeles Times*, cited for criticizing "pending litigation," carried their cases through to victory in the U.S. supreme court on Dec. 8 and June 10, 1941, respectively; the *Miami Herald* (Fla.) in 1944 was not so fortunate. Newspapers applauded as a victory for press freedom the decision of the U.S. supreme court on May 4, 1943, annulling a city ordinance which restrained Jehovah's Witnesses from distributing their pamphlets. Unprecedentedly, on April 13, 1943, the U.S. district court of New York, on charges brought by the attorney general, fined 15 department stores \$80,000, under antitrust laws, for their combined action in withholding advertising from the *New York Times* in protest against raised rates—the grounds were that "readers feared the lack of advertising meant shortage of merchandise due to the war." (See also CIVIL LIBERTIES.)

Campaign for World Free Press.—U.S. agitation for "a world-wide free press" or international guarantee of free news communication—a movement proposed by Kent Cooper, general manager of the Associated Press—got under way in 1944. The American Society of Newspaper Editors on April 21 appointed a 14-man committee to push the idea. Planks endorsing the proposal were included in both Republican and Democratic national platforms; a resolution was circulated for adoption by state legislatures in August; both houses of congress endorsed it unanimously in September. A Commission of Inquiry on Freedom of the Press, consisting of 17 experts, was set up by *Time*, *Life* and *Fortune* magazines, aided by the University of Chicago, Chicago, Ill. A free press mission of three men delegated by A.S.N.E. started on Dec. 28, 1944, and spent three months visiting London, Cairo, Iran, Moscow, China, India, Australia, New Zealand and South America. A resolution was adopted at the Mexican conference in March 1945 and the plan was encouraged by the British-American Telecommunications conference in Bermuda in December. Press freedom was established by U.S. authorities in Italy, France, Germany, Austria, Japan and partly in South America, but in July, 100 correspondents sat outside the Big Three conference at Potsdam and the newspapers opposed a free press rider attached to the United Nations Relief and Rehabilitation Administration relief bill in congress. Much progress had been made by 1946, but there remained the firm opposition of the soviet union and the habits of old world leaders who still thought in terms of a controlled national press to provide propaganda for nationalistic governments. The next step in the plan involved a provision in the final peace treaty and the United Nations organization.

Newspaper-Radio Peace.—The 15-year-old conflict be-

Accredited war correspondents seated before Pres. Roosevelt and Prime Minister Churchill during an open air press conference at Casablanca in 1943



tween radio and the newspapers ended in 1937 with the settlement out of court of the \$1,700,000 suit of Transradio against 17 newspaper competitors. Two basic areas of conflict reached adjustment during the decade: it became evident that radio advertising was not materially reducing newspaper advertising—although it seriously damaged magazines—and it was discovered that radio newscasting stimulated “the appetite for news” and increased newspaper sales rather than reducing them. Belatedly in May 1939 Associated Press relaxed its rule forbidding broadcast of its dispatches; U.P. and I.N.S. had been selling theirs freely to radio for some time. The listening staffs set up in 1939 by the press agencies to glean elusive facts from foreign short-wave radio were shortly disbanded as useless. Some resentment resulted from the hearings started by the Federal Communications commission in March 1941, over the ownership by newspapers of 249 of the 838 radio stations, but the hearings were finally ended in Jan. 1944 without conclusion. Associated Press in 1941 set up a subsidiary, Press Association Inc., to sell radio news to non-members. The *New York Times* began news broadcasting over WMCA in Nov. 1941. By 1946, almost 200 newspapers had applied for permits to operate the new frequency modulation stations. All through the war, press and radio co-operated so closely that the public could not tell which to credit for the news. The intense interest in radio war news developed listening habits in the public that forced radio stations, after the war, to set up staffs for gathering local news, instead of borrowing from the press. In retrospect, one of the greatest effects of radio on newspapers was the stimulation of newspaper columnists to compete with radio commentators.

Financial Shoals.—In terms of internal problems, any newspaper publisher would say that the decade was a period of “hard times” and difficult financial crises. Shortages of materials and manpower, rising costs, reduced revenues and strikingly altered budgets kept publishers in faithful attendance at their association meetings to find some answers to their difficulties. Beginning with a “recession” in 1937 and the last four years of a long, hard depression, the decade shifted into a war period which accentuated the financial problems of the press—because newspapers, while notably changed by wars, never had made much money during wars. The postwar year 1946 offered a chance to make money, but materials were lacking.

Paper was undoubtedly the biggest problem of the business managers. There was plenty in 1937, but the price was rising; Canadian newsprint went up 17%, setting prices at \$48 or \$50 a ton. As a result, Texas publishers co-operated in building a \$5,000,000 plant to pulp southern pine; it got into production by 1940. Prices and supply held steady in 1938, 1939, 1940 and 1941, although other types of paper were becoming scarce during the latter year. By the end of 1942, paper shortage developed, economies began and chlorine shortage resulted in gray paper; the price was frozen at \$50 a ton, but in December committees from the newspapers were meeting in Washington, D.C., to plan rationing. In 1943, paper shortage resulted in a succession of cuts handled by a 25-man Newspaper Advisory committee, largely to protect smaller newspapers from the inroads made by rising circulations of metropolitan newspapers; four cuts ordered that year, on a sliding scale, reduced paper use 10% below 1941, and the Office of Price Administration authorized a price rise of \$8 a ton. For 1944 the cut ranged from 4% for weeklies

to 24% for large dailies; to save paper, newspapers were freezing circulation, raising sales and advertising rates, omitting classified advertising from mail editions, rationing advertising, reducing Saturday editions to eight pages and in some cases omitting advertising for several days at a time. Much discussion of possible use of 30-lb. paper (instead of 32) was heard, as well as of “ersatz” or de-inked paper. In spite of rising circulations, in 1944 rationing reduced consumption 17% below 1943, more devices to save paper were proposed, and even the smallest printing offices were rationed, but price was unchanged and 30-lb. paper was abandoned as uneconomical. Shortage continued in 1945, and two price rises carried to \$68 a ton; through voluntary rationing newspapers reduced paper use from 20% for the smallest to 37% for the largest, below 1941. On the plea of 85% of the press, all paper controls by the War Production board ended on Dec. 31, 1945, but newspapers started measures to avoid a mad scramble for paper and set up a share-the-paper plan through their associations. The year 1946 saw paper even more scarce than before and the price rose to \$75 a ton in August.

Advertising and Circulation.—Advertising held up through the decade better than anyone expected and supplied most of the money to pay for costly news services, thus saving U.S. newspapers from the political subsidies that had cursed the press of other countries. In that respect, advertising proved to be the bulwark of press freedom, providing stable financial support to pay the printer, with a minimum of outside influence. Attacks by consumers’ leagues that coloured the early 1930s gradually died away as advertising eliminated its more glaring faults; nostrums and quacks almost completely disappeared. In 1937, some 552 dailies banned liquor advertising, and 178 banned beer. Radio advertising, while materially damaging magazines, became less and less embarrassing to newspapers. During 1937, advertising declined slightly because of raised rates, and went down 13% more in 1938, forcing radical shifts in budgets; to revive advertising, 774 newspapers formed the Bureau of Advertising on a national scale. Advertising, down 34% since 1929, rose 2% in 1939; little change was seen in 1940, but the Continuing Study of Newspaper Reading was started and analyzed 24 newspapers to bolster advertising. Down somewhat in 1941, advertising held steady in 1942 and that year, because of shortage of consumer goods, it changed from “selling goods” to urging “wise buying” and “keeping the firm name alive for the postwar market.” National and classified advertising increased sharply in 1943, but local advertising declined somewhat; 1944, however, brought a 16% increase for smaller newspapers. Gains were widespread in 1945, and advertising soared with the postwar buying boom of 1946. Advertising evidenced at the end of the decade sounder, less objectionable practices than ever before.

Circulation totals soared and selling prices rose all through the period to record-breaking levels. The two-cent newspapers began giving way to three-cent and five-cent in 1937; subscription prices were raised in 1938; another sharp rise in prices came in 1942; by 1945 most newspapers were five cents a copy, and readers spent more than \$800,000,000 during the year for their newspapers. During the ten years the burden of circulation in the income budget rose from 10%-12% to 25%-30% on most newspapers. The steady rise of daily newspaper circulation totals was indicated by these figures from annual directories: in 1937 the 41,400,000 daily and 31,000,000 Sunday were the highest on record; reader reaction to raised prices

brought a decline of 4.4% in 1938; a rise of nearly 4% in 1939 regained some of the losses; another rise of 4.5% in 1940 showed mostly in the morning newspapers; interest in war news raised the total 2.5% daily and 4% Sunday in 1941; in spite of paper shortage, 1942 showed 2.35% daily gain and 7.15% Sunday rise, while New York city newspapers gained 400,000 to 10,000,000 copies daily; another gain of 2.6% brought the total to 44,000,000 in 1943; paper restrictions held that total through 1944; another 6.4% increase in 1945 raised the total to an all-time high of 48,384,188; no decline was evident through 1946. (See also ADVERTISING.)

Rising Wages and Strikes.—Manpower problems of the decade involved rising wages, shortage of help, strikes, greater employment of women, and the Newspaper Guild of Newsmen. Wages of all newspaper mechanical and editorial employees were rising and hours were being shortened through 1937 and 1938; a sharp rise of about 30% in wages came in 1939; the great struggle over shorter hours marked 1940; many small dailies became five-day newspapers in 1941; through the rest of the decade hours shortened and wages rose steadily, with a sharp upturn in the postwar years of 1945 and 1946. No notable strikes of mechanical workers were recorded until 1941; in October of that year seven major New York city newspapers were tied up by a news dealers' trade boycott; again in Dec. 1942 12 New York newspapers faced a three-day strike of newspaper deliverers. A series of strikes by mechanical workers, encouraged by new rules of the International Typographical union, began in 1944, and through 1945 such strikes were widespread and in many cases long and bitter, resulting in the common sight of newspapers being printed from photographic plates. Again in July 1945 17 New York newspapers were off the streets for 17 days because of a deliverers' strike. Early 1946 brought new I.T.U. wage demands which threatened a long and bitter struggle.

Most spectacular in the labour field was the story of the Newspaper Guild of newsmen. Launched in 1934 as a professional organization, in 1936 the guild became an American Federation of Labor union; in 1937 it shifted to Congress of Industrial Organizations and broadened its base by taking in business office employees to double its strength. In 1937, with 11,000 members and 50 contracts, it became belligerent and waged strikes in 9 newspaper offices; in 1938, the guild struck in 19 newspaper plants, battling especially with William Randolph Hearst. In 1940, its membership was up to 18,755 but it waged fewer strikes and its great leader, Heywood Broun, died on Dec. 18. One strike tied up the *Chicago Herald-Examiner* (Hearst) for 17 months and killed the morning edition. A house cleaning of the more radical and communistic elements was carried out in 1940 and 1941, with fewer strikes. By 1942, the guild was settling down, and signed a contract with the *New York Times*. Most of the struggle was over. In 1944, the guild had some 20,000 members, mainly in the larger cities and had become quite stable and accepted.

Improved Appearance.—Much change and refinement in the physical aspects of the newspaper came during the decade. Quite a revolution in make-up took place in 1938, with new streamline headlines, departmentalized news sections, more use of colour printing and much greater use of pictures, including extended use of the telephoto. All of this was handicapped by war conversion of industry. By 1942 no new presses, linotypes, typewriters or cameras were available, and all the metals needed in printing and photography became scarce. In 1945, Associated Press said

it had delivered 150,000 wirephotos in 10 years. But most notable was the gradual disappearance of sensationalism and crime news, and the increased seriousness of the news columns, with greater interest in editorial pages and columnists. Because of that fact, plus the excellent coverage of war news, and the outstanding newspaper war services, popular criticism of the press almost completely disappeared. An organized movement was launched to attain better public relations for newspapers; beginning in 1940, an annual newspaper week each October attracted thousands of visitors to newspaper offices.

"One-Daily Cities."—Much was written about "the disappearing daily" because of the decline in the number of daily newspapers—although paradoxically, as the grand total decreased, the directories recorded that more cities had dailies. The explanation was that economics was killing off the weaker second newspapers and increasing the number of cities that had just one strong newspaper, while in smaller cities weeklies were becoming dailies; by 1946, the number of "one-newspaper cities" approached 90% of all cities with dailies. By years the trend was as follows: the hard times of 1937 killed 23 dailies and reduced the total to 2,004, smallest in 40 years, but weeklies increased by 176 to 10,629, foreign language newspapers went up to 135, and Negro papers up to 214; in 1938, some 57 more dailies died; exactly 51 disappeared in 1939 but weeklies increased by 25, and the "one-daily cities" had grown from 353 in 1899 to 1,083 in 1939; few mergings and an increase to 2,015 marked 1940; the years 1941, 1942, 1943 and 1944 saw little change; the decade ended with 2,004 dailies and 10,430 weeklies, 283 semiweeklies and 35 triweeklies. The most noticeable casualties were among the "newspaper chains," especially Hearst and Scripps-Howard, because the new tax laws prevented strong chain members from carrying "weak sisters." Following the death of Arthur Brisbane on Dec. 25, 1936, William R. Hearst began shrinking his newspaper list; besides ending his Universal News service, he closed 5 newspapers in 1937, reducing his chain from 25 papers in 18 cities to 20 papers in 14 cities; in 1938 he set up a 10-year trust and sold 6 radio stations; in 1939 he disposed of 4 more newspapers; by 1946, he still owned 18 newspapers in 13 cities. The Scripps-Howard string disposed of 3 newspapers in 1938 and 4 in 1939, and ended the decade with 19 newspapers, the smallest number in many years. Although 1946 recorded 15% of the daily newspapers owned in groups, they were held by 56 groups, of which only 5 had more than 10 newspapers each. Negro newspapers, all weeklies but one, increased during World War II to 225.

Only two notable newspapers were launched during the decade—*PM* (Picture magazine), started in New York city in 1940 and the *Chicago Sun* in 1941. Both were started or shortly owned by Marshall Field. Famous newspapers that disappeared were: *New York* (morning) *American* in 1937; *Minneapolis Journal* in 1939; the 111-year-old *Boston Transcript* in 1941; the *Philadelphia Public Ledger* in 1941; *Kansas City Journal* in 1941; and *Milwaukee Post* in 1942. Other interesting changes were: the *Milwaukee Journal* adopted employee-ownership in 1937; the Western Newspaper union bought the *American Press* in 1938; Associated Press acquired the *New York Times Wide World Photo* service in 1941; John S. Knight bought control of the *Chicago Daily News* in 1944; and the *Chicago Times* adopted employee-ownership in 1944.

Greatest News Stories of the Decade.—Aside from the war stories, the following news events were important

enough to appear in the "Ten Big Stories" during various years of the decade: in 1937, President Roosevelt's supreme court battle, the C.I.O. steel strike and sit-down strikes in auto factories, the burning of the Zeppelin "Hindenburg" with 97 deaths, New London, Tex., school explosion, Amelia Earhart's disappearance on a Pacific flight, Ohio river flood; in 1938, New England's September hurricane, Douglas Corrigan's "wrong-way" flight to Ireland, Howard Hughes's flight around the world, Milwaukee railroad "Olympian" wreck in Montana, Orson Welles' radio "Invasion from Mars"; in 1939, death of Pope Pius XI and election of Pius XII, disasters of three submarines, U.S. "Squalus," British "Thetis," French "Phenix," visit of British king and queen to the United States; in 1941, the strike in captive coal mines; in 1942, Republican comeback in November elections, Eddie Rickenbacker's rescue at sea after plane crash, Boston Coconut Grove night-club fire tragedy; in 1943, pay-as-you-go federal taxes, Alfred De Marigny murder case, Errol Flynn trial; in 1944, Hartford, Conn., circus fire, Cleveland, O., gas explosion, trial of Charlie Chaplin on Mann act charges, eastern hurricane; in 1945, President F. D. Roosevelt's death on April 12, Labour party victory in British elections, crash of bomber into Empire State building in New York city, General Motors strike; in 1946, the Nuernberg trial and Goering's suicide, Republican landslide in November, U.N. assembly and Foreign Ministers' meetings in New York city, the Bikini atomic bomb tests. (See also CHRONOLOGY OF EVENTS.)

Ten Turbulent Years for Magazines.—Although less dramatic than the newspaper story, the adventures of the magazines and other periodicals during the decade evidenced more difficult problems, more struggle to keep alive, more drastic changes and more casualties in their ranks. Paper shortage and the inroads of radio on magazine advertising caused them most trouble. Their story may be told in chronological order:

The year 1937 witnessed the boom of picture magazines, the great development of the condensed pocket digest and the growing popularity of pulp magazines. The new *Life*, launched as a picture magazine in 1936, led the pack and was imitated by 20 others in 1937, including *Midweek Pictorial* and *Look*—circulations ran to 6,000,000. *Reader's Digest*, founded in 1922, still adless, and now up to 2,000,000, had 31 imitators in 1937, of which 15 promptly died. Pulp magazines increased to 150, with total circulation ranging from 7,000,000 to 10,000,000. *New York Woman* became *Newsweek*, *Delineator* merged with *Pictorial Review* and *Literary Digest* disappeared.

In 1938, *Ken* was the only newcomer, *Scribners* adopted pictures and *Harper's Bazaar* took up photos in place of its famous line drawings. Pulp magazines declined in the face of the photo magazines, local wars on sex copy and increase of detective serials in general magazines; but they improved in literary quality. Digest magazines declined in general but prospered in special fields. Mimeographed leftist and amateur photo magazines had a brief rage.

In 1939, *Ken* and *Scribners* died; *American Mercury*, *Saturday Review of Literature* and *North American Review* changed hands. Comic-strip books, formerly for children, now for adults, came in. Movie magazines declined. Pulp magazines came back with pseudo-science. Trade journals were very prosperous. More serious nonfiction and many war articles were seen in all magazines. The total number went up to 6,432, including 3,466 monthly and 1,399 weekly.

All circulations went up in 1940, with *Time*, *Life*, *News-*

week, *United States Weekly* leading. The war was emphasized in *Life*, *Look* and *Liberty*. While *Cosmopolitan* and *McCall's* stressed friendly fiction and pleasant home news, *Collier's*, *Saturday Evening Post* and *Ladies' Home Journal* liked signed human interest articles on the war. *Fortune* began its public opinion surveys. More risqué stories and light fiction in the pulps provided escape from war. *Reader's Digest* passed 4,000,000 and started a South American edition. The total number of magazines increased slightly, with monthlies up and weeklies down.

In 1941, advertising fell off seriously. Most picture magazines declined, except *Life* and *Look*. The old-time *American Boy* (plus *Youth's Companion*) was revived. War articles, written by roving correspondents and sent by cable or radio, filled general magazines. *Time* began aeroplane editions in Spanish. Trade papers were very strong. Leading circulations were: *Saturday Evening Post* 3,300,000; *Life* 3,200,000; *Collier's* 2,900,000; *Liberty* 2,300,000; *American* 2,200,000; *Cosmopolitan* 1,800,000.

In 1942, advertising declined further, all magazines showed smaller size, and paper had become a real problem under rationing. More war articles by dare-devil correspondents rivalled the newspaper war reporting. *Saturday Evening Post* changed its cover and format. Some 500 magazines appeared with U.S. flags on their covers in July. Father Charles E. Coughlin's *Social Justice* was barred from the mails, and *Scribner's Commentator* got into an ugly scandal over subversive material, involving *North American Review*, *Living Age* and *Current History*.

In 1943, with magazine paper consumption reduced 25%, all magazines were smaller and many appeared on much lighter papers. Not only did advertising decline, but *Life*, *Fortune* and others refused much advertising. Circulations were still high. Much war material filled the general magazines, and all carried much free advertising for war bonds. *Esquire* was in trouble with the post office over its Varga nudes and lost its second class mail privilege.

The year 1944 saw more thin paper, reduced advertising and more newspaperlike war correspondents' articles in all leading magazines. Some 1,212 magazines published free war bond advertisements. Lightweight overseas editions were printed by 27 magazines.

Some newcomers appeared in 1945. *Holiday*, a travel magazine, was launched by Curtis Publishing company. *World Report*, a weekly devoted to foreign affairs, was started by David Lawrence of the *United States News*. *The Moderator* appeared in Boston, Mass., and there were rumours of a new daily newsmagazine, *AM*, in New York city. Marshall Field added *Childcraft* and *World Book Encyclopedia* to his string. *Time* announced plans to build new plants in Chicago, Ill., and Los Angeles, Calif. OWI discontinued its wartime magazines, *Voir* and *War Times* in 1945.

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Great Britain and Europe.—The ten years 1937-46 increased the gap between the newspapers of Great Britain

With the liberation of Europe the underground papers of the resistance were able to publish openly. At the same time those responsible for the wartime *émigré* newspapers published in London returned to their own countries, taking, in many cases, their newspapers with them. The end of the war saw, therefore, a substantial increase in the number of newspapers published in most of the countries of western Europe compared even with the prewar totals. Most of these newspapers were comparatively small in circulation and much behind British and U.S. standards of newspaper production and news coverage. Many of them had inadequate financial resources even for the purposes they sought to fulfil. Some of them finally merged with others of like mind and similar economic difficulties. But

Front page of the first airmail edition of the London *Daily Mail* which was flown to the U.S. on microfilm in Jan. 1944

The cost of newspaper production had reached such proportions that a substantial advertising revenue was an essential of commercial success. No national daily newspaper could meet its costs—which were likely to range between £4,500,000 and £6,000,000 a year—out of revenue from sales alone. The economic basis of their industry forced British newspapers to follow one of two courses. Advertising revenue could be secured by a “quality” circulation among the comparatively wealthy, whose means made them both individually and in the aggregate attractive to the advertiser, or else by a mass circulation reaching



Portuguese newsboy in Lisbon, offering a cosmopolitan selection of reading matter in a city crowded with refugees during 1941

a sufficient number of people of small means to make their combined purchasing power worthy of attention.

The "quality" market was numerically small. It was dominated nationally by the *Times*. The only other competitor for it, the *Morning Post* had been unable to survive and had amalgamated with the *Daily Telegraph* which sought, with considerable success, to develop an intermediate market lying between the small quality circulation of the *Times* and the mass circulation of the popular national dailies by appealing particularly to the small professional classes and middle class workers. But the main possibility of expansion lay in the vast popular market, and it was here that competition became most acute. In the attempt to secure circulation and the advertising revenue that went with it, the popular newspapers developed, as extraneous aids to sales, free insurance policies for all readers and their families and free gifts to subscribers ranging from complete sets of Dickens and other popular writers to free washing machines, and suits.

It became theoretically possible—and almost so in fact—to furnish and equip one's home and dress oneself and one's family by a judicious placing of orders between competing newspapers. This circulation race, in which Lord Beaverbrook's *Daily Express* led with the Labour *Daily Herald* second, was at its height immediately before World War II. The war brought this particular form of competition to an end. In order to save newsprint, which had to be imported, all newspapers were reduced in size by government order and were then allowed a ration of newsprint fixed according to their 1939 consumption. Additionally, they were prohibited from canvassing for circulation and

from distributing to news agents on a sale and return basis, with the result that newspaper circulations were in the main frozen at their 1939 levels, although some papers, notably the *Daily Express*, succeeded, by skilful use of their newsprint allocation, in meeting to some extent the increased demand brought by the war. At the same time the starting of new papers was prohibited, although this affected periodicals more than newspapers, for the capital required for launching a new daily paper capable of competing with those existing was so substantial and the possibilities of loss were so great that no new daily papers had in fact been started for many years.

Economically, British newspapers now found themselves in an enviable position. Their costs were substantially reduced by the enforced economies in newsprint and the similarly enforced abandonment of costly extraneous aids to circulation. Moreover, instead of having to compete for advertisements they found that as a consequence of the reduced advertisement space available, advertisers competed for the privilege of buying their space. Although the absorption of commercial undertakings into war production reduced the number of commercial advertisers, a new advertiser in the shape of the government entered the field with large expenditures by many departments, such as the ministry of food. At the same time, the war brought a great increase in readership demand, and the habit of reading more than one newspaper, when procurable, spread. Newspapers thus became more profitable enterprises than at any time in their history. Editorially, reduced size

forced newspapers to abandon most of the magazine and pictorial features with which they had sought to win circulation and to concentrate on improved reporting and presentation of news. The improvement in editorial technique was considerable.

A temporary relaxation of control was permitted in the latter half of 1946, when newspapers were allowed an additional quota of newsprint to enable them to produce slightly larger newspapers. At the same time the government agreed that for a trial period newspapers should be allowed to sell freely up to the limit of readership demand, although the prohibition on canvassing and on noneditorial aids to circulation was retained. At the end of this trial period, a new assessment for the allocation of newsprint was to be made, based on the circulation figures of each paper at that time instead of in 1939, as had previously been the case. A permanent removal of controls on newsprint was not possible because of foreign exchange difficulties.

The daily newspapers benefitting most from this freeing of circulation were the *Daily Express*, which rose to a sale of more than 3,750,000 copies a day, and the *Daily Mirror*—a tabloid, which had achieved considerable popularity with the armed services during the war by a skilful combination of leftist political views and strip cartoons, and which increased its circulation by 750,000 copies, although its total sales still remained second to those of the *Daily Express*.

It was noteworthy, however, that the largest percentage increase was gained by *The Times*, although its total circulation remained small compared with those of the popular dailies. The *Daily Telegraph* and the *Manchester Guardian* also recorded significant increases.

In the Sunday field, the largest increase fell to the *News of the World*, which announced almost immediately the phenomenal circulation of nearly 7,500,000. This paper specialized in extended reporting of police court cases and in a comprehensive coverage of all sports. The second largest increase was secured by the *Sunday Pictorial*, the Sunday companion of the *Daily Mirror*.

Although in the mass circulation field there was thus no evidence of any substantial movement of readership taste towards the more serious newspapers, there were notable advances in this direction among the weekly periodicals. Serious political reviews such as the *New Statesman* and the *Spectator*, for example, achieved a circulation far in excess of anything that had seemed possible before the war.

One other tendency of considerable significance and one which aroused some public anxiety was the development of chain newspaper systems through the purchase or control of formerly independent provincial newspapers by London groups and the closing down or merging of many such papers. The main groups concerned in this tendency were the Kemsley newspapers, the Westminster press and Northcliffe newspapers. Considerable apprehension was aroused among working journalists by what many of them feared to be a trend toward monopoly, which would further restrict editorial freedom. At its annual conference in 1946 the National Union of Journalists passed a resolution asking for a royal commission to inquire into the press. This request was supported by a substantial number of Labour M.P.s., and in October the government agreed to give time for a parliamentary debate on the matter and to allow a free vote, in which the party whips would be withdrawn. During the debate, attention was called to the fact that in the preceding 25 years the number of London morning papers had been reduced from 12 to 9, the num-

ber of London evening papers from 6 to 3, the number of morning papers in the English provinces dropped from 45 to 18 and the number of provincial evening papers from 88 to 65. A motion calling attention to increasing public concern at the growth of monopolistic tendencies in the press and asking that a royal commission should be appointed to inquire into the finance, control, management and ownership of the press in order to further the free expression of opinion throughout the press and the greatest practicable accuracy in the presentation of news was carried by 270 votes to 157. The government then undertook to appoint such a royal commission without, however, binding itself in advance to take action on its recommendations. (See ADVERTISING; PHOTOGRAPHY.) (F. Ws.)

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New York

One of the original 13 states of the union, popularly known as the "Empire state," New York covers an area of 49,576 sq.mi., of which 1,647 sq.mi. are water. With a population of 13,479,142 (1940) and an estimated population on July 1, 1945, of 13,946,957, it retained its place as the most populous state. The foreign-born population was 2,853,530 in 1940, and the urban population 11,165,893. The capital is Albany, with a population of 130,577. Other cities: New York (7,454,995); Buffalo (575,901); Rochester (324,975); Syracuse (205,967); Yonkers (142,598); Utica (100,518); Binghamton (78,309) and Troy (70,304).

The chief executive officers of the state at the beginning of the decade 1937-46 were: governor, Herbert H. Lehman; lieutenant governor, M. William Bray; comptroller, Morris S. Tremaine; attorney general, John J. Bennett, Jr. (all Democrats). The legislature consisted of 30 Democrats and 22 Republicans in the senate and 77 Republicans and 74 Democrats in the assembly. Among the more important laws passed during the 1937 session were those providing for: creation of a labour relations board; establishment of a state mediation board within the labour department; payment of income taxes by constitutional officials of the state; regulation or prohibition of the transportation of goods manufactured with child labour; prohibition of duress, intimidation and coercion of employees through the means of the pay roll envelope or otherwise; establishment in the labour department of a division of minimum wage for women and minors; a permissive bill for women to sit on juries; extension for another year of the moratorium on mortgage foreclosures; a "career" bill for state employees; and a \$1,000,000 revolving fund for the rehabilitation of properties against which mortgage certificates had been sold.

In addition, the following amendments were approved and became part of the state constitution: an amendment making the term of governor and lieutenant governor four years, instead of two years; an amendment making the term of assemblymen two years instead of one; an amendment permitting sheriffs to succeed themselves; and an amendment permitting a defendant in a criminal case to waive a jury trial except when the crime was punishable by death, and providing that a verdict might be rendered by five-sixths of the jurymen. An extraordinary session of the legislature was called in December for the purpose of enacting a new municipal code. In the 1937 election, 84 Republicans, 61 Democrats, 4 American Labor party mem-

342 bers and one American Labor party-Republican were elected to the assembly.

In Nov. 1938, Gov. Lehman defeated Thomas E. Dewey (Rep.) by an announced 2,383,584 votes to 2,316,078. Norman Thomas (Soc.) polled 18,052. Charles Poletti was elected lieutenant governor. Robert F. Wagner was re-elected to the U.S. senate by a majority of 447,397.

A constitutional convention devoted about four months to the task of amending the constitution. In Nov. 1938, nine amendments were submitted to the electors. An "omnibus" amendment was passed which contained 49 proposals, reaffirming the Bill of Rights, protecting users of telephone and telegraph from wire-tapping; asserting the rights of grand juries to interrogate public officials; defining the pensions and retiring allowances of civil servants as a "contractual relationship" with the large financial liability involved; confirming tax exemptions of charitable, educational and religious institutions, and transportation of children of denominational schools at public expense; and other provisions. Amendments reapportioning seats in the legislature, outlawing proportional representation and one containing judiciary provisions, were defeated. The other five, carried by wide margins, were amendments clearing up grade crossings; authorizing provision of "low-rent housing for persons of low income," and a bond issue of \$300,000,000 for this purpose; authorizing a maximum 8-hr. day and 5-day week at standard wage on public work, with collective bargaining; permitting grants and loans to private agencies for social welfare; and excluding \$315,000,000 for transit unification from the debt limit of New York city. For the cost of the convention, \$1,350,000 was appropriated of which \$200,000 was not expended.

(H. H. L.; X.)

At the election of Nov. 7, 1939, Associate Judge Irving Lehman of the court of appeals was nominated for chief judge of that court by the Democrats and was endorsed by the Republicans. He was unanimously elected. The legislature, Republican-controlled, passed for the second time an amendment to the constitution modifying the provision against gambling to permit pari-mutuel betting on horse races, and directing that the state should receive a reasonable revenue from the system. The amendment was submitted to the people on Nov. 7 and was ratified by a vote of two to one. The legislature adopted a budget of \$388,000,000 for the fiscal year of 1939-40, which was \$27,000,000 smaller than the amount recommended by the governor. It levied a tax of two cents a package on cigarettes, and the liquor tax was increased by 50 cents a gallon. An income tax on the salaries of federal employees was voted, and the appointment of a legislative auditor to assist in framing the budget was authorized. Provision was made for free bus transportation and the extension of public health and welfare service to children attending parochial and other private schools. The expenditure of not more than \$1,000,000 a year on a state housing program was voted.

Other measures adopted were a constitutional amendment extending the term of senators from two to four years; a reduction to 15% of the cost of removing grade crossings to be levied against the railroads; barring civil service and teaching positions to all persons advocating the overthrow of the government by force; placing the control of home relief in the hands of localities; extending the mortgage moratorium to July 1, 1940; making it a misdemeanour to sell merchandise not marked with the place of origin and forbidding "loss leaders" in retail

trade; eliminating primary elections where there was no contest for a nomination; and advancing \$900,000 for federal flood control projects on condition that the money be returned to the state.

In the election of Nov. 5, 1940, Roosevelt (3,251,918), with the aid of the American Labor party, won the state electoral vote. The straight Republican vote for Wendell Willkie (3,027,478), however, was 192,978 greater than the straight Democratic vote for Roosevelt. James M. Mead, Democrat, was re-elected to the U.S. senate. Three vacancies on the bench of the court of appeals were filled by the election of Edmund J. Lewis and Albert Conway, endorsed by the Republican, Democratic and American Labor parties; and C. S. Desmond, supported by the Democrats against a Republican opponent. The Republicans retained control of both houses of the legislature, making a gain of three seats in the senate and two in the assembly, giving them 30 of the 51 senators and 87 of the 150 assemblymen.

The legislature passed an act authorizing pari-mutuel betting at race tracks. A budget of \$391,600,000 and a supplementary budget of \$1,791,000 were approved. The governor ordered the attorney general to make an exhaustive inquiry into all subversive activities within the state and directed all other public officials and their subordinates to co-operate in the investigation. Scandals arising from the award of state printing contracts led the governor to appoint a commission to make an investigation. The Public Service commission began to carry out a program for 68 grade-crossing projects.

During 1941, the legislature created a division of commerce to take over the work of the state planning council and publicity bureau. To discourage circulation of scurrilous campaign documents, a law was passed forbidding political circulars not bearing the name and address of the printer or agency responsible for them. The emergency income tax of 1% was not renewed, thus saving the taxpayers \$21,000,000 a year. An appropriation of \$247,000 was voted to the committee investigating the cost of public schools and the extent of subversive activity in them. The appointment of boards to inquire into labour disputes was authorized, and the mortgage moratorium was continued for another year. Persons voluntarily leaving their jobs were barred from unemployment insurance benefits; the creation of a state defense council was authorized; an appropriation of \$600,000 for vocational education was voted; and several bills barring radicals from subversive activities were killed. The voters approved an amendment permitting the use for highway improvement of the proceeds of an issue of \$60,000,000 in bonds originally authorized for the elimination of grade crossings.

The legislature at its 1942 session created a state war council with broad powers, authorized the waiving of the 40-hr. week on public work and the maximum number of hours a day for employment on private work, permitted the use of prison labour for war production, reduced the state income tax by 25% for 1942 and 1943, and passed a congressional reapportionment act continuing the practice of electing 43 of the 45 representatives by districts and two at large. It also authorized the construction of a super-highway.

As the state was to elect a governor in 1942, President Roosevelt sought to induce the Democrats to nominate U.S. Senator Mead, but James A. Farley succeeded in bringing about the nomination of John J. Bennett, Jr. The Republican candidate, Thomas E. Dewey, was elected by a plurality of more than 500,000 votes, the first Republican to be elected to the office in 20 years. The Republi-



Manhattan's Stage Door Canteen, a noted recreation spot for Allied servicemen and women during World War II

cans also elected the lieutenant governor and state comptroller, while the Democrats elected the attorney general. Three supreme court judges were re-elected in the first district and five judges were elected in the second district. President Roosevelt appointed Governor Lehman as director of foreign relief and rehabilitation. The governor resigned on Dec. 3 to take up his new duties and was succeeded by Charles Poletti, the lieutenant governor, who served until Jan. 1, 1943.

In 1943, the legislature changed the date of the opening of the fiscal year from July 1 to April 1, raised the pay of state employees 7½% and 10%, appropriated \$25,000 for child-care centres under the state council for children whose mothers were engaged in war work, continued the Commission on Postwar Planning, put disabled veterans of World War II on the same basis as veterans of World War I, permitted the continuance of free lunches in schools, removed the stigma of conviction of crime in the case of deserving youth between the ages of 16 and 19, created an Emergency Food commission, and reapportioned the legislative districts. An election was held to fill the vacancy caused by the death of the incumbent lieutenant governor. The Republicans nominated state Senator Joseph R. Hanley, and the Democratic candidate was Lt. Gen. William N. Haskell, who was also supported by the American Labor party. Hanley was elected by a majority of about 350,000 votes. (G. W. Do.; X.)

The legislature concluded one of the shortest sessions in the state's history on March 18, 1944. Practically all of Gov. Dewey's program was enacted, including the setting aside

of a \$148,000,000 state surplus as a postwar reconstruction fund; creation of a commission to co-ordinate services for returning veterans; continuation of the 25% reduction in the state personal income tax; extension of maximum unemployment insurance benefits to all state war veterans; broadening of the state's postwar public works program; full state aid for education; creation of a state department of commerce; creation of a commission to investigate racial discrimination; reform of the administration of the Workmen's Compensation law; provision for a full soldier ballot; continuation of the Emergency Food commission; and revision of the laws of succession to the office of governor.

Appropriations from the general fund at the 1944 session of the legislature totalled \$367,775,845.15, and additional appropriations totalling \$7,739,312 were also made for the first time from the Postwar Reconstruction fund. The Republicans continued control of the state administration and both houses of the legislature. The presidential vote in the state was as follows: Dewey and Bricker (Rep.), 2,987,647; Roosevelt-Truman 3,304,238 (Dem. 2,478,598; American Labor party 496,405; Liberal party 329,235); Teichert and Galbaugh (Industrial Government) 14,352 and Thomas and Hoopes (Soc.) 10,553.

Gov. Dewey created a reconversion service agency in 1945, to clear the tracks for business conversion from war production and to assist industry to full employment of the state's labour resources. The commissioners of commerce, public works and labour were appointed by the governor, and part of the staff of the state war council was transferred to the department of commerce to help carry out the purposes of the agency. A division of veterans'

New York: Statistical Data
Table I.—Education (Public)

	1936	1938	1940	1942	1943	1944
Elementary school pupils	1,636,720	1,593,852	1,505,592	1,427,161	1,375,189	1,296,901
High school pupils	651,322	714,604	738,542	741,596	648,387	583,089
Elementary teachers	60,266	57,809	56,350			
High school teachers	27,041	29,416	25,999			

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1942
Cases on general relief	283,179	287,824	275,179	240,870	199,949	
Cost of general relief	\$11,385	\$10,826	\$9,958	\$8,585	\$7,241	
Recipients of old-age pensions		110,445		118,750	121,496	117,214
Cost of pensions		\$2,670		\$3,035	\$3,003	\$3,287
Dependent children receiving aid		69,336		71,210	65,242	52,430
Blind receiving aid		2,638		2,847	2,845	2,815
Workers under unemployment compensation		3,051,981	3,159,999	3,213,400		
Prisoners	10,379	11,263	12,067	18,196	18,093	17,564

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1942	1945
Highway mileage		14,801	14,822		14,043		
Expenditure on highways	\$94,756	\$91,093	\$76,861	\$158,946		\$15,088	
Railroad mileage	8,017	7,824	7,786		7,731		7,707

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1942
State revenue	\$494,968	\$580,314	\$585,916		\$428,108	
State expenditure	429,734	498,959	465,187		391,048	
State net debt	525,900	541,988			529,460	
State gross debt	726,024			\$727,529	\$751,757	
Number of banks	910	900	888	876		
Total bank deposits	\$19,911,900	\$19,591,700	\$22,097,400	\$25,286,100		

Table V.—Agriculture
(All figures in thousands)

	1937	1938	1939	1940	1941	1943(est.)
Acreage, principal crops	6,786	6,718	6,601	6,691		
Income from crops and livestock	\$322,700	\$293,300	\$311,332	\$334,427		\$596,654
Leading crops (bu.):						
Apples	21,528	15,048	24,650	12,936	16,120	12,250
Barley	3,059	4,307	3,942	3,799	2,664	
Corn	23,856	25,345	24,465	21,452	26,169	23,177
Grapes (tons)	89	56	76	76	75	44
Hay (tons)	5,747	5,436	4,177	5,554	4,189	
Oats	18,800	26,588	25,806	29,966	24,166	
Pears	1,305	1,924	1,749	1,670	1,272	
Potatoes	28,375	26,840	26,797	26,838	2,766	29,127
Tobacco (lb.)	1,148	1,680	1,620	1,750	2,100	660
Tomatoes	1,872	1,955	1,955	1,780	2,592	
Wheat	8,276	7,533	6,382	7,996		

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1935	1937	1939
Wage earners	878,592	995,658	957,854
Wages paid	\$991,678	\$1,236,048	\$1,163,785
Value of products	\$5,963,850	\$7,314,447	7,134,400
Leading manufactured products (value):			
Clothing		\$842,557	\$917,563
Printing		576,731	426,761
Bakery products		243,386	204,501
Steel products		157,810	197,885
Boots and shoes		125,819	104,145

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1941	1942	1943
Total value mineral production	\$77,660	\$73,217	\$78,384	\$190,319		
Leading products (value)						
Pig iron	55,790	25,451	45,276	66,718	\$78,735	\$79,874
Coke	29,854	23,529	25,527	32,809	37,661	39,092
Ferroalloys	18,080	7,700	18,389			
Natural gas	12,388	19,419	15,201			
Petroleum	14,140	9,530	10,650	13,300	16,000	15,200
Stone	11,244	10,527	10,111	10,806	11,513	8,917
Cement	8,826	7,893	9,866	16,674	16,031	8,766
Salt	5,796	5,467	5,855	7,417	8,158	9,329
Zinc	4,250	2,870	3,745	5,767	8,520	9,936

affairs in the executive department was created by the legislature with an appropriation of \$2,825,000. Aid to veterans included advice on re-employment, education, welfare, job training and business opportunities. The governor negotiated the transfer of army and navy housing for conversion into homes for veterans and their families.

The legislature also extended insurance benefits for unemployed workers up to \$21 a week for a maximum of 26 weeks, and enacted unemployment insurance experience rating for employers making a successful effort to main-

tain stable pay rolls. This resulted in tax credits to qualified employers totaling \$76,500,000. The administration of workmen's compensation was improved and coverage extended. The Ives-Quinn Anti-Discrimination bill was passed, as were bills creating a youth commission designed to combat juvenile delinquency; giving municipalities the right to acquire property for rehabilitation; providing for additional loans for public housing; and raising the limit on state subsidies for housing.

Both in 1945 and 1944, large surpluses of \$163,000,000 and \$156,000,000 were transferred on recommendation of the governor to the Postwar Reconstruction fund. Altogether, about \$800,000,000 in public works construction was planned for the reconversion period. Appropriations from the general fund at the end of 1945 totalled \$370,000,000 and, at the same time, the personal income tax was reduced by one-fourth for the second year. State financial aid to municipalities was increased. More than \$100,000,000 was distributed to localities as their share of the personal income, franchise, utilities, motor vehicle, motor fuel and alcoholic beverage taxes. In addition, the state paid out almost \$150,000,000 to localities for support of common schools, relief and welfare and other state aid. Altogether 42% of state tax revenues was returned to localities in aid or shared taxes.

Results of the 1946 state elections, in which an all-time record of more than 5,000,000 votes were cast, represented a landslide victory for the Republican party. Gov. Thomas E. Dewey, running against coalition candidate James M. Mead, was re-elected by the largest majority in New York gubernatorial history. All of his running mates were successful, including Lt. Gov. Joseph R. Hanley and Atty. Gen. Nathaniel L. Goldstein. The party gained 6 seats in the house of representatives, as well as 16 seats in the state assembly and 6 in the state senate, giving Republicans control of the state legislature. The Liberal party acquired legal status by registering more than the required number

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New York City

Apparently reliable though unofficial estimates at the end of 1946 placed the population of New York city, the largest in the United States, at only a little less than 8,000,000; the federal census of 1940 showed a population of 7,454,995.

The decade ending with 1946 was distinguished primarily in New York city by the intensification of problems arising in a growing city of intense concentration of population. Some of these problems appeared to be less serious than others, but students of the metropolis and its life agreed that their nature had remained more or less constant—the subways, municipally owned and operated, continued to lose money on the five-cent fare, and the deficit had to be met by revenue from other sources; the heavy street traffic, consisting of automobiles, taxicabs, buses and motor trucks, caused a steadily increasing congestion for which no over-all remedy was found; the housing shortage and the absence of adequate hotel accommodations made living conditions for tens of thousands of persons precarious in the extreme; a constant succession of strikes, and threats of strikes, involving workers of many types, caused much apprehension, uncertainty and sometimes discomfort; the support of various municipal services, such as schools and hospitals, presented increased difficulties and crime and juvenile delinquency, particularly during and after World War II, showed a serious increase. Many types of business, notably the great garment industry, began with greater or less speed to move to cities with lower tax rates, better living conditions and cheaper labour. For the last fiscal year of the decade the tax rate was \$2.66 for every \$100 of assessed valuation, making possible a budget of more than \$750,000,000.

Unquestionably the most notable New Yorker, both in reputation and accomplishment was Fiorello H. La Guardia, the short, pudgy, impulsive sometime radical, who was mayor of New York city for three terms (12 years), from Jan. 1, 1934, to Jan. 1, 1946, when he was succeeded by a Democrat, William O'Dwyer, a native of Ireland who had been a labourer, policeman, magistrate, prosecutor and army officer.

It was largely La Guardia, with his vigorous personality and his many ideas, which gave New York city its peculiar tone and colour during the eventful decade. He hated Tammany Hall, the old Democratic organization of New York county, and his success at the polls, together with an accumulation of scandals, gravely diminished the power of Tammany. La Guardia professed warm friendship for union labour; he fought against racial discrimination of all sorts; he insisted upon an efficient and honest police force, and the results obtained under his police commissioner, Lewis J. Valentine, were generally praised; he was outspoken in his attacks upon "political fixers" and "tinhorn gamblers"; he did not hesitate to attack powerful newspaper publishers when he thought them wrong and he was credited, in spite of the many handicaps under which he was forced to work, with giving the city an admirable administration and with building many public works. In the fall of 1945 he said, with characteristic confidence, that if he chose to run for a fourth term he

could be elected if he ran on a "laundry ticket"; instead, he formed a new city party, the so-called "No-Deal" party, which favoured the election of Newbold Morris. Opposed to Morris were Jonah J. Goldstein, who had the backing of the Republicans, the Liberal party and the City Fusion party; and O'Dwyer, the Democrat, who had become a brigadier general in the U.S. army during World War II and was widely known for his success while district attorney of Kings county (Brooklyn) in breaking up a notorious organization of thugs and racketeers popularly known as Murder, Inc. With the opponents of the Democrats divided, the election of O'Dwyer was assured.

When Mayor O'Dwyer took office at the beginning of 1946, he kept many of the La Guardia appointees, notably the park commissioner, Robert Moses, and Arthur Wallender, who had been made police commissioner in the last months of the La Guardia regime. Notwithstanding the generally successful reputation of the La Guardia administration, Mayor O'Dwyer came into office facing problems of the most pressing nature—in particular, such problems as the obsolescent subway system, the necessity for replacing or improving much of the city's plant and the demands of many city employees for more pay. In addition, he had to deal with a series of strikes—subway workers, the marine union, truck drivers and so on—which at times threatened the food and fuel supply of the city's residents.

Of particular interest to politicians was an attempt by Mayor O'Dwyer, as titular head of the Democratic party in his city, to "reform" Tammany Hall. It was agreed that some time would be necessary to obtain such reform, and by the end of 1946 the mayor had not yet succeeded in placing his own candidate, Frank J. Sampson, at the head of Tammany.

From time to time during the decade, various city planners, as well as outside observers of urban life, contended that New York city, as a place in which to live and do business, had about reached the saturation point. This school of thought, which argued that New York had virtually reached the end of its industrial development, and that in fact it might be at the beginning of a serious decline, was opposed by another school of thought, which held that New York city, by its very nature, would for

Merchandise littering the streets of Harlem, New York city, after the Negro riot of Aug. 1-2, 1943





many years remain the centre of the management genius of the United States, that it would become more and more a national cultural centre and that its position as the nation's playground and show-window—with its many theatres, night clubs and other amusements—would remain unimpaired for decades.

Among the exciting and much debated events was the holding of the New York world's fair on a large site which had been built up on the Flushing meadows in Queens county. This fair, which was held in 1939 and then held over for another year, attracted much attention nationally and even internationally, and was generally regarded as an artistic success, though the backers only got back about 40 cents for each dollar they invested. (See FAIRS, EXHIBITIONS, EXPOSITIONS.)

The end of the decade found New York city still in an uncertain position so far as its part in the air age was concerned. Under the leadership of Mayor La Guardia, a large airport, named for the mayor, was built on Flushing bay, mostly of made land. After only three or four years' use it became apparent that it was too small; moreover, the land was sinking, and it was not clear whether repairs would be worth the cost. Meanwhile, during the last two years of his administration, Mayor La Guardia launched a vast project for an airfield to be known as Idlewild, farther out on Long Island. One of Mayor O'Dwyer's first acts when he assumed office was to lop off \$45,000,000 from the planned expenditure for this field; however, work on the field went ahead.

In the closing days of 1946 John D. Rockefeller, Jr., caused world-wide interest by announcing that he was giving a large tract of land on Manhattan Island, just above 42nd street on the East river, as a site for the building of the capital of the United Nations. (See also MUNICIPAL GOVERNMENT.)

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New Zealand, Dominion of

New Zealand is a self-governing dominion of the British commonwealth with a legislature consisting of a governor-general representing the king, an elected house of representatives and a nominated legislative council. It consists of two large and several small islands in the south Pacific some 1,200 mi. east of Australia. The area of the dominion proper is 103,416 sq.mi. (North Island 44,281 sq.mi., South Island 58,092 sq.mi., Stewart Island 670 sq.mi., Chatham Islands 372 sq.mi.). The Cook Islands and other outlying islands annexed to New Zealand have an area of 519 sq.mi. New Zealand also administers the Tokelau Islands and the Ross dependency, administers Western Samoa under a mandate and shares the mandate for Nauru.

The capital is Wellington (by the 1945 census, 173,420 inhabitants). Other chief towns are Auckland (263,370), Christchurch (150,047) and Dunedin (83,351). A census was taken in 1936 and again in 1945. At the end of March 1936 the population was 1,573,927; in Sept. 1945 1,702,298. The Maori population is included in the above

figures—in 1945 it was 98,744; since it had been 82,326 in 1936, its increase was more rapid than that of the white population. Practically the entire increase in the dominion's population was represented by the increase in the North Island, which in 1946 accounted for 67.3% of the total dominion population as compared with 64.7% in 1936. The drift to the towns was also marked—in 1936, 59.54% of the population lived in cities and boroughs; in 1945, the figure was 63.12%. The strongest religious denominations as recorded in the 1936 census were Church of England 600,786; Presbyterian 367,855; Roman Catholic 195,261; Methodist 121,012. Governors-general: Viscount George Galway (April 12, 1935–Feb. 3, 1941), Air Marshal Sir Cyril Newall (Feb. 22, 1941–April 19, 1946), Lt. Gen. Sir Bernard Freyberg (after June 17, 1946). Prime ministers: M. J. Savage (Dec. 6, 1935–March 27, 1940); Peter Fraser (after April 1, 1940).

New Zealand's history during the decade 1937–46 may be best discussed in four sections—the first concerned with the development of the Labour government's policy; the second with New Zealand's part in World War II; the third with trends in New Zealand's economy, resulting partly from the government's policy, partly from the war, and partly from a continuation of long-term tendencies; the fourth with the development of New Zealand's external relations.

Labour Government's Policy.—The Labour government, first in the country's history, came into office in Nov. 1935 after New Zealand had suffered a severe economic depression. The basis of the policy on which it was elected and which it later put into operation was the restoration of prosperity, the establishment of new and higher living standards for the people and the organization of New Zealand's economy so as to protect it against another depression. Much of the legislation needed to give effect to this policy was passed during the 1936 session. In that year cuts in salaries and wages made during the depression were restored, and pensions were resumed and increased. The jurisdiction of the arbitration court over industrial disputes was restored—compulsory arbitration had been in force since 1894, but had been abolished during the depression. The principle of a 40-hour, 5-day week for industry wherever possible was established, and compulsory unionism was introduced. Minimum wages and conditions were laid down for dairy farm workers who had previously suffered through lack of legal protection. A Primary Products Marketing act protected the farmers against world price fluctuations by providing that the government should take over at a guaranteed price all dairy produce for export. The guaranteed price fixed in 1938 for butterfat was 15.88d. per lb. for butter and 17.88d. for cheese. (During the war years the basic guaranteed price was increased and supplemented by special cost allowances so that in 1946 it stood at 20.394d. for butter and 22.394d. for cheese.) In 1939 an internal marketing division of the marketing department was set up to organize the domestic marketing of dairy produce and other foodstuffs. Its activities expanded rapidly, particularly during the war years, and at the end of the decade it exercised control over butter, eggs, honey, potatoes, bobby calves, imported and locally grown fruits, hops, maize, barley and certain farm manures.

A central reserve bank set up in 1934 was placed under full government control in 1936. Since the bank was empowered to make such advances to the government as might be necessary, this measure enabled the government to ensure that men and materials did not remain idle

Rockefeller Center, after its completion in 1940, became a pivotal centre of the New York business and entertainment world



Mrs. Roosevelt receiving the traditional Maori "hongi" or nose kiss from her native guide, Rangī, when she visited Whakarewarewa, New Zealand, in Sept. 1943

through a shortage of the money necessary to bring them into useful employment. This power was used with restraint. In the prewar period reserve bank advances and investments totalled £23,500,000, mainly for housing purposes; in the war period the total increased by £11,400,000 for all purposes. In Dec. 1938, as a result of the depletion of New Zealand's sterling balances in London, the government introduced measures of import and exchange control. The import of certain types of goods was drastically reduced in this way, and others were totally prohibited.

With New Zealand's economy stimulated and protected by the measures described above, the government was able to embark upon an unprecedented expansion of social services. The most important item in this program was given effect in the Social Security act, 1938, which provided for the replacement of the old noncontributory pensions by social security benefits, for the creation of new types of benefits and for medical and other health benefits. These sums were paid into the social security fund and supplemented, if necessary, from the consolidated fund. Social security benefits were paid to old people, to widows, orphans, invalids and others who could not secure employment. For instance, a man over 60 would receive £104 a year for himself plus £52 for his wife (unless she was over 60 and eligible for the full £104) and £26 for each child under 16. In this and the other benefits mentioned above there were limits on the other income which could be received by beneficiaries, but with the universal superannuation benefit and the family benefit there was no such limit. The superannuation benefit, which started at a rate of £10 a year in 1940 and was to increase by £2.10s. a year until it reached a maximum of £104 in 1978, was payable

to everyone at the age of 65. It would eventually replace the age benefit. Before 1945 there was an income limit for recipients of the family benefit, but this was removed to make a universal family benefit of £26 a year for every child under 16.

The social security health benefits were brought into force at intervals beginning in 1939. Owing to the opposition of the doctors it was not possible to introduce the medical benefits scheme as originally planned, and in 1946 there were two alternative schemes in force, under the most general of which 7s.6d. of the doctor's fee was paid by the state. Except for specialists, doctors either accepted the 7s.6d. as full payment or charged 3s. extra. Medicines—except proprietary medicines—were supplied free under social security when prescribed by a doctor. Expenditure on social security for 1945-46 was £22,960,000. Corresponding pensions in 1936-37 amounted to £4,900,000.

State housing was another new feature of Labour policy. New Zealand, like other nations, was suffering from a housing shortage for many years, and in 1937 a special housing construction branch of the State Advances corporation was set up. Finance was made available for this work at 1% for the first £5,000,000 and at 1½% for subsequent sums. By 1946, loans for housing under the scheme totalled more than £31,000,000; more than 21,000 state houses were built. In 1945, a record number of 9,000 state houses were completed. These were let at very moderate rentals—for instance, the rent of a four-room state house varied from 24s. to 26s.9d. a week. Rents of houses let by private individuals had been controlled since 1936.

At the same time, existing social services were extended. For instance, expenditure on education, which was £4,032,266 for 1936-37, rose to £7,979,605 for 1945-46. In 1944 the school leaving age was raised to 15 years. The government gave special attention to the welfare of the Maori people, who shared equally with the rest of the population in the benefits of the social security scheme. Maori land development and housing schemes were pushed ahead energetically in the period. Even during the war years it was possible to continue this program of social reform. In particular, notable advances were made in labour legislation. In 1944 the Annual Holidays act was passed, providing for an annual holiday of two weeks on full pay for all workers, permanently or casually employed, who were not otherwise provided for. In 1945 the Minimum Wage act established minimum wage rates of £5 5s.0d. a week for men and £3 3s.0d. for women and an amendment to the Shops and Offices act brought the 40-hour 5-day week to shop assistants and clerical workers.

Two other important measures of government policy were put into effect in 1945. The Electoral Amendment act abolished the country quota, which for 60 years had given country areas more representation in proportion to population than town areas. The Bank of New Zealand act made complete the state's partial ownership of that bank.

At the elections held in Oct. 1938 Labour gained for the first time an absolute majority of the votes cast. But since the conservative Democratic party which had contested the 1935 elections had now disappeared, this did not mean an increase in the seats held by Labour in the house of representatives. In fact, Labour seats fell from 55 to 53, Nationalists increased from 19 to 25, and Independent fell from 6 to 2. In March 1940 J. A. Lee, who had been undersecretary to the minister of finance, was expelled from the Labour party for attacks which he had published against the then prime minister, M. J. Savage. He formed a Democratic Labour party in which he was joined for a while by W. E. Barnard, speaker of the house, who later unsuccessfully contested his seat as an Independent. As a result of the war the elections which normally would have been held in 1941 were not held until Sept. 1943. At these elections the left-wing vote was split by the Democratic Labour party as the right-wing vote had been split by the Democratic party in 1935. Labour seats fell to 45, Nationalist seats rose to 34, the single Democratic Labour seat disappeared, and only one Independent seat remained. At the election on Nov. 27, 1946, Labour dropped to 43 seats while the National party advanced to 37.

New Zealand and World War II.—Immediately after the New Zealand government had received news that Great Britain was at war with Germany it issued a declaration of war as from 9:30 P.M. Sept. 3, 1939. In the six years that followed New Zealand sent its forces overseas to fight the axis powers by land, sea and air; in 1942 it faced the threat of invasion of its own shores by the Japanese, and mobilized its productive strength to make the greatest possible contribution to the common cause.

On July 17, 1940, the government delegated control of all matters connected with the war effort to a war cabinet of three government and two opposition representatives. A war council set up in the previous month comprising representatives of various branches of industry continued to act in an advisory capacity until Aug. 1942. In June 1942 a wider participation of the opposition in the war effort was secured for a while by the establishment of a war administration of eight Labour and six opposition

ministers and by the enlargement of the war cabinet to include the leader of the opposition, S. G. Holland. This arrangement ended in October of the same year when Holland and three of his colleagues resigned in protest at the government's handling of a strike in the Waikato coal fields. Thereafter the war effort was controlled by the war cabinet consisting of Peter Fraser, Walter Nash (minister of finance), D. G. Sullivan (minister of industries and commerce), F. Jones (minister of defense), J. G. Coates (died May 27, 1943), A. Hamilton and Sir William Perry (from June 1943).

Compulsory military service for men between 18 and 45 was introduced in June 1940. By the end of 1941 the transfer of manpower from industry to the armed forces had reached a point where important industries were finding it very difficult to secure labour to maintain production. The entry of Japan into the war and the consequent mobilization of the home defense forces aggravated the situation, and measures of industrial manpower control became essential. These were introduced from Jan. 1942 onward. Certain industries were declared essential; in these, employment could not be terminated by worker or employer without the consent of the district manpower officer. Men in the age span of 18 to 59 years, and women in the age span 18 to 40 years, were made subject to direction to essential work. These measures of manpower control were lifted after the war.

The first echelon of a New Zealand division sailed for Egypt in Jan. 1940. In April 1941 the division fought against overwhelming odds in Greece, and a month later in Crete. In November of the same year it took part in the second Libyan offensive and in particularly bitter fighting at Sidi Rezegh. After this it was transferred to Syria to rest, but in June 1942 the New Zealanders were rushed again to the western desert where Marshal Erwin Rommel was menacing the entire British position. After

Anzac day ceremonies in 1942. Patrick J. Hurley, U.S. minister to New Zealand, laying a wreath at the base of a cenotaph in Auckland



playing what Winston Churchill declared was "a magnificent, a notable and even decisive" part in stemming the German advance, they formed part of the spearhead that broke through the German line at El Alamein in November. In the next six months they fought a series of actions in Libya and Tunisia against the retreating axis forces until on May 13, 1943, axis resistance in North Africa came to an end.

In Oct. 1943 the division was moved to Italy. After fighting in the Sangro offensive in November it was moved to the west coast to take part in the Rapido offensive and the long, grim battle for Cassino. Later in 1944 it fought at Sora, Arezzo Florence and Faenza. In April 1945, in the offensive that was to end the war in Italy, the New Zealand division crossed a number of formidable river barriers to link up with Yugoslav forces at Monfalcone and enter Trieste. The division was under the command of Lt. Gen. Sir Bernard Freyberg, who later became governor general of the dominion.

From early in the war New Zealand troops had garrisoned certain Pacific islands, and at the beginning of 1942 New Zealand forces in Fiji were increased to divisional strength and transferred to New Caledonia. Between Sept. 1943 and Feb. 1944 this division cleared the Japanese from Vella Lavella, Mono and Nissan islands in the Solomons area. After the defeat of Japan a New Zealand contingent went to form part of the British commonwealth occupation force in that country.

During the war 48,000 New Zealanders joined the air force, and 30,000 of them served overseas. Seven New Zealand squadrons, flying fighters, heavy and medium bombers, torpedo bombers and flying boats served in Britain and elsewhere. New Zealand airmen, in fact, served in every theatre where the royal air force operated. Royal New Zealand air force squadrons also co-operated with United States forces in the war against the Japanese. New Zealand's pre-entry training scheme to fit civilians for air force duties was the first of its kind and was followed in other parts of the British commonwealth.

The New Zealand cruiser "Achilles" gained fame early in the war at the River Plate engagement which led to the sinking of the "Graf von Spee." In Feb. 1941 another New Zealand cruiser "Leander," sank the Italian raider "Ramb 1" in the Indian ocean. Both these cruisers as well as smaller New Zealand war vessels later served against the Japanese in the Pacific. As was inevitable from New Zealand's geographic situation, the part played by men of the merchant navy in the war effort was vitally important, exacting and often dangerous.

New Zealand's home defenses were augmented by a part-time home guard and an emergency precautions service. Service in each was made compulsory after Japan came into the war, and the home guard attained a peak strength of 124,000 and the E.P.S. 150,000. When it seemed that New Zealand might be invaded, a substantial home defense force had to be built up in addition to the forces that were being maintained overseas. U.S. forces arrived in New Zealand from early 1942 onward to assist in its defense and prepare for offensive operations against the Japanese.

Women's auxiliary services served with the army, navy and air forces. The women's auxiliary air force was the first to be established in Jan. 1941, and the women's auxiliary army corps was the largest, with a peak strength of 4,600. Many "Waacs" served in the middle east and Pacific; others were posted to coastal batteries and anti-aircraft stations in New Zealand. Still other women did splendid work in the army nursing service. The war work of women's organizations in New Zealand was co-ordinated through the women's war service auxiliary, which attained a membership of 75,000.

Although the Maori people were exempted from the operation of conscription, they gave full support to the common effort. The Maori battalion which served with the division in the middle east never lacked volunteers, and a second Maori battalion was formed in New Zealand when the Japanese threat developed. In 1942 the govern-

Agricultural production in New Zealand reached peak levels during World War II, when intense efforts were made to contribute toward food requirements of Allied armies in the Southwest Pacific. Farmers in New Zealand are shown stacking hay



ment set up a Maori war effort organization under P. K. Paikea to direct the organization of Maori manpower for the forces and industry.

In all, 135,000 New Zealand men and women served overseas during the war. The armed forces attained a peak strength of 157,000 in Sept. 1942, when there were 127,000 in the army, 6,000 in the navy, and 24,000 in the air force. Of these numbers 43,000 were overseas and 114,000 mobilized in New Zealand. Casualties suffered were 10,100 New Zealand servicemen killed in the war, 19,300 wounded, and at one time 8,100 were prisoners in axis hands. Of the 6,522 decorations won, eight were Victoria crosses, one with bar.

In production, too, New Zealand's wartime achievements were considerable. Here, of course, the main effort was in providing primary produce for Britain, whose need of it became more acute after the German occupation of western Europe cut off supplies nearer at hand. Great difficulties had to be overcome to maintain and increase production—shortages of manpower and fertilizers, bad seasons in 1942-43 and 1943-44 and switches from butter to cheese production and back again at the request of the United Kingdom.

During the war 1,980,000 short tons of meat, 753,500 tons of butter and 687,500 tons of cheese were sent to Britain. Rationing of meat and butter, introduced to make the largest possible quantities available, still continued at the end of the decade. When U.S. forces arrived in the Pacific, New Zealand became a supply base for them also. Nearly £40,000,000 of food was supplied to the United States during the war, including 209,000 short tons of meat, 25,300 tons of butter and 150,700 tons of vegetables. The provision of the vegetables entailed an especially remarkable effort in which new ground was brought under vegetable production, canning plants were expanded and new dehydration plants established.

New Zealand's productive effort was not confined to farming. Through the willingness of workers to work longer hours and through the efforts of new recruits to industry, notably women, factory production rose steadily despite the manpower shortage. Some activities which were carried on previously on a very minor scale developed during the war to the status of substantial industries. Among these was shipbuilding; more than 500 ships, including mine sweepers, submarine chasers, tugs and barges, were built in New Zealand during the war. This industrial expansion was made possible by the increase in New Zealand's coal production, which stood at a record figure in 1939, but increased every year after then.

By 1946, more than 150,000 servicemen had already benefited under New Zealand's rehabilitation scheme. Loans were provided for men who wished to build homes, set up in business or buy farms. Former servicemen had been saved from buying land at inflated prices by the Land Sales act of 1943, which pegged land values at the level ruling in Dec. 1942. Training in farming and vocational training in skilled trades were given to former servicemen who desired them. Rehabilitation bursaries enabled others to study full time at universities, some of them on postgraduate bursaries overseas.

Up to Dec. 1945 New Zealand's total war expenditure was £574,000,000. Of that sum £246,000,000 was obtained from taxation, £233,000,000 from loans and £95,000,000 from lend-lease. All the money borrowed for war purposes from Great Britain under the memorandum of security agreement, amounting to some £60,834,000, was repaid.

Economic Trends.—New Zealand's overseas trade became the highest, per capita, in the world and nothing

was of more importance to its economy. The development of manufacturing was also important. This was a result partly of general prosperity, partly of government encouragement, direct and through import control, and partly of the needs of the war. Between 1937 and 1943 the number of persons engaged in factory production increased from 96,401 to 114,590, despite the mobilization of many workers for the forces.

Particularly striking was the increase in electric power generated, from 1,141,958,000 units for 1936-37 to 2,273,839,000 units in 1944-45. Even this increase was not able to keep pace with the increased demand of private and industrial consumers, and in the winters of 1945 and 1946 New Zealand suffered from a shortage of electric power.

These production advances were accompanied by an increase in the national income. Aggregate private income, which was £157,500,000 for the year ended March 31, 1937, rose to £292,300,000 for the year ended March 31, 1944. These figures include salaries and wages which more than doubled, rising from £85,900,000 to £176,500,000. The trend was, of course, in large part a healthy one, reflecting the rise in production and the liberation of the national economy from a deflationary condition.

But New Zealand, like all other belligerent countries, had to face the situation during World War II by which incomes continued to rise while the volume of goods available for civilian consumption was drastically reduced. In this lay the threat of inflation. Price control, which had been in operation since the start of war, was merged in a general economic stabilization scheme to hold prices, costs and wages in Dec. 1942. This scheme operated so successfully that the cost of living during the years 1939-45 rose by only about 14%.

External Relations.—In 1937 New Zealand was represented abroad only by its high commissioner in London and by departmental officers such as trade and tourist commissioners in various countries. In 1938 the British government appointed a high commissioner in New Zealand through whom, and not through the governor general, the New Zealand government communicated with the British government. Through W. J. Jordan, its representative at the League of Nations assembly at Geneva, it made clear its adherence to collective security and opposition to appeasement in the years before World War II. The close co-operation that was necessary between New Zealand and the other United Nations during the war led to the expansion of its representation in the countries of the British commonwealth and to the establishment of diplomatic posts in foreign countries. From 1942 New Zealand and the United States were represented by ministers in each other's countries; in 1944 New Zealand sent a minister to the U.S.S.R. and from 1945 both the U.S.S.R. and France were represented by ministers in New Zealand. In 1942 New Zealand sent a high commissioner to Canada and in 1943 to Australia. In June 1943 a department of external affairs was set up with Peter Fraser as the first minister of external affairs. Previously, external relations had been the function of the prime minister's department. The external affairs department as it then existed had been concerned solely with the administration of New Zealand's island territories.

The Canberra pact between New Zealand and Australia in Jan. 1944 provided for consultation and co-operation between the two countries, particularly on matters concerning the South Pacific area. The New Zealand government, however, recognized that peace could not be

New Zealand: Statistical Data

Item	1938		1940		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain		£NZ1.25 = £1		£NZ1.26 = £1		£NZ1.25 = £1
United States		£NZ1 = \$3.92		£NZ1 = \$3.06		£NZ1 = \$3.24
Finance						
Government revenues	£47,934 (\$234,347)		...		£163,295 (\$658,897)	
Government expenditures	£42,450 (\$207,538)		...		£155,496 (\$627,428)	
Gold reserves	£2,249 (\$10,993)		£2,361 (\$9,044)		£2,253 (\$9,090)	
National debt	£232,891 (\$1,138,605)		£258,309 (\$989,324)		£372,922 (\$1,504,742)	
Transportation						
Railroads		3,323 mi.		3,570 mi.		3,684 mi.
Highways		58,338 mi.		...		59,096 mi.
Airways		1,886 mi.		...		1,353 mi.
Communication						
Telephones		192,019		...		244,753
Telegraph lines		12,063 mi.		...		11,980 mi.
Radio sets		284,995		345,682		380,660
Minerals						
Coal		2,488,739 tons		2,818,031 tons		3,001,646 tons*
Gold		152,050 oz.		195,665 oz.		170,000 oz.*
Pumice		3,412 tons		3,546 tons		3,445 tons*
Crops						
Clover and hay		1,069,975 tons		1,106,617 tons		1,067,257 tons†
Wheat		181,319 tons		240,303 tons		297,241 tons†
Potatoes		164,399 tons		158,038 tons		155,729 tons†
Lucerne		120,826 tons		115,487 tons		123,131 tons†
Oats		52,818 tons		41,622 tons		56,175 tons†
Livestock						
Sheep		32,378,774		31,062,875		...
Cattle		4,506,082		4,533,032		4,447,160†
Swine		756,466		714,001		803,876†
Forest Products						
Total		322,765,786 bd. ft.		335,991,000 bd. ft.		324,473,000 bd. ft.*
Timu		184,588,054 bd. ft.		207,097,000 bd. ft.		192,609,000 bd. ft.*
Kahikatea, white pine		43,662,352 bd. ft.		33,043,000 bd. ft.		29,733,000 bd. ft.*
Pinus radiata (Insignis)		36,359,183 bd. ft.		46,762,000 bd. ft.		55,247,000 bd. ft.*
Matai		21,254,997 bd. ft.		21,212,000 bd. ft.		18,672,000 bd. ft.*
Sea Products						
Wet fish		19,942 tons†		18,997 tons		17,470 tons†
Oysters (dredged)		67,243 sacks†		75,145 sacks		73,475 sacks†
Crayfish		518 tons†		452 tons		723 tons†
Manufactures						
Total	£91,239 (\$446,069)	...	£103,243 (\$395,420)	...	£124,445* (\$502,137)	...
Food	£45,573 (\$222,807)	...	£49,861 (\$190,969)	...	£55,000* (\$221,926)	...
Heat, light and power	£5,770 (\$28,208)	...	£6,990 (\$26,772)	...	£7,966* (\$32,143)	...
Wood and paper	£5,597 (\$27,366)	...	£6,623 (\$25,366)	...	£7,079* (\$28,565)	...
Clothing	£5,097 (\$24,921)	...	£6,445 (\$24,683)	...	£9,312* (\$37,575)	...
Exports—Total	£46,386 (\$226,781)	...	£58,375 (\$223,576)	...	£65,024* (\$262,370)	...
Butter	£13,258 (\$64,817)	146,000 tons	£14,581 (\$55,847)	147,000 tons	£13,182* (\$53,188)	131,000 tons*
Meats (frozen and chilled)	£12,112 (\$59,214)	301,000 tons	£15,744 (\$60,300)	391,000 tons	£14,221* (\$57,382)	322,000 tons*
Wool	£9,779 (\$47,810)	136,000 tons	£13,499 (\$51,703)	150,000 tons	£14,668* (\$59,187)	154,000 tons*
Cheese	£4,763 (\$23,286)	90,000 tons	£6,586 (\$25,226)	113,905 tons	£9,488* (\$38,283)	151,000 tons*
Imports—Total	£44,477 (\$217,449)	...	£39,196 (\$150,119)	...	£43,082* (\$173,386)	...
Motor vehicles	£4,362 (\$21,326)	33,000	£796 (\$3,048)	6,000 tons	£277* (\$1,116)	1,000 tons*
Electrical machinery and equipment	£2,662 (\$13,016)	...	£2,049 (\$7,846)	...	£1,553* (\$6,265)	...
Miscellaneous apparel and ready-made clothing	£1,776 (\$8,684)	...	£447 (\$1,712)	...	£758* (\$3,059)	...
Gasoline	£1,518 (\$7,421)	122,845,000 gal.	£1,716 (\$6,572)	112,395,000 gal.	£1,228* (\$4,954)	71,142,000 gal.*
Defense						
Standing army personnel		500		27,000		
Reserves		8,000		...		
Standing navy personnel . . . . .		...		200		
Standing air force personnel . . . . .		...		3,000		
Military expenditures	£1,559 (\$7,623)	...	£4,562 (\$17,471)	...		
Education						
State elementary schools		2,230†				2,230*
Students		245,786†				245,592*
Secondary schools		197†				197*
Students		55,300†				46,398*
Universities		1†				1*
Students		5,979†				4,373*

safeguarded on a purely regional basis and was wholehearted in its adherence to the ideals of the United Nations. In 1945 its viewpoint on international security was put forward by Peter Fraser at the San Francisco conference and at the first meeting of the general assembly of the United Nations in London in early 1946, and at the Paris peace conference by H. G. R. Mason and W. J. Jordan.

(P. Fr.)

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Niacin (Nicotinic Acid)

See BIOCHEMISTRY; CHEMOTHERAPY; MEDICINE; VITAMINS.

Nicaragua

Largest of the Central American republics, Nicaragua is situated between Honduras on the north and Costa Rica on the south. Area, 57,144 sq.mi., of which 3,475 sq.mi. is water. Pop. (1944 est.), 1,048,642; the population by the 1940 census was 983,160; later official estimates were as follows: 1941, 1,013,946; 1942, 1,030,700; 1943, 1,043,603. Racial distribution of the population was estimated at 68% mestizo, 17% white, 10% Negro and 5% Indian; Negroes remained in the majority in a few communities along the Mosquito coast. The population density, as officially estimated in 1942, was 18.04 per sq.mi., varying from 2.57 in the department of Zelaya to 318.19 in the department of Masaya; three other departments had population densities exceeding 100 per sq.mi. The capital is Managua (1941 official pop. est., 87,620); other urban centres are León (31,799); Granada (25,530); Masaya (21,070); Chinandega (15,377) and Bluefields (10,099).

The constitution of March 22, 1939, established a unitary government with 15 territorial departments, a president chosen by direct, popular election for a six-year term, a bicameral legislative body including a senate of 15 members elected for six years (plus all elected ex-presidents, serving for life) and a chamber of deputies (of 40 members) chosen on a population basis. Presidents during the decade 1937-46 were Carlos Brenes Jarquín, provisional president from June 1936 to Jan. 6, 1937; Anastasio Somoza, after the latter date.

(R. H. FN.)

Somoza's Leadership.—Nicaragua had entered a period of relative tranquillity after the resignation of President Juan B. Sacasa in June 1936. The National Liberal and National Conservative parties united to nominate a single candidate for the presidency of the republic, General Anastasio Somoza. Somoza was elected by an immense majority in December and took office in Jan. 1937, forming a government of national union. Carlos Brenes Jarquín had acted as provisional president in the interim.

In Aug. 1937 a controversy arose with the neighbouring republic of Honduras as a result of the two nations' long-standing border disputes. Two airmail postal stamps, one of which included and the other excluded the disputed territory, gave rise to the conflict, which seemingly could only be solved by force of arms. The friendly services of the United States induced the countries to accept mediation, which was carried out by means of conferences in San José, Costa Rica. The tribunal of mediation was composed of the foreign minister of Costa Rica, a delegate from the United States and another from Venezuela. Each delegation, presided over by the foreign ministers of Nicaragua and Honduras respectively, presented its case and discussed the matter before the tribunal of mediation, which was suspended after some time for an indefinite period.

In Aug. 1938 the national congress of the republic ratified a decree of 1936 relating to complete reform of the constitution and the constitutional laws. By this decree, the people were called upon to elect representatives to a constituent assembly, regulations were made to apply the principle of minority representation, and a technical commission of seven jurists (four members of the majority party and three of the minority) was created to prepare a preliminary draft of the projected new constitution.

The election of 55 representatives took place on Sunday, Nov. 6, 1938; the national constituent assembly was installed the following Dec. 15, and the new constitution promulgated on March 22, 1939. The constitution was eminently democratic; it included standards implying a complete renewal of national institutions, with the principle of minority representation; it stated the modern concept of property as a social function, and the postulates of social justice respecting the fundamental rights of the people.

The national constituent assembly, acting in full sovereignty, elected Somoza president of the republic for a term lasting from March 30, 1939, until May 1, 1947. The assembly also converted itself into a legislative assembly composed of two chambers: the senate, composed of 15 proprietary senators, 15 substitutes, and the ex-presidents of the republic, who had held office by direct popular election as senators for life. The chamber of deputies was composed of the other 40 representatives.

Somoza was inaugurated a second time on March 30, 1939. He immediately asked permission of congress to visit Washington, D.C., and left Nicaragua on April 20, 1939, in full exercise of his powers as president. Peace in Nicaragua remained undisturbed during his absence, and the country derived numerous benefits from his visit to President Franklin Roosevelt. In the economic sphere, Somoza succeeded in maintaining the stability of currency and obtained a loan of \$2,000,000 from the Export-Import Bank of Washington, later increased by an additional \$2,000,000 as Nicaragua complied fully with its commitments to pay. In the military sphere, a military academy was established, directed by a high officer of the United States army, in conformity with the agreement negotiated between Presidents Somoza and Roosevelt.

Somoza meanwhile had interested himself in the improvement of the national army, and the creation of an academy fulfilled his wish of forming a new, consolidated officer corps trained in the techniques of modern war and thus increasing the prestige of the only armed force.

In the international field, the president succeeded in modifying the Canal convention of 1914 (proclaimed in 1916), circumscribing the navigation of the San Juan river, an indispensable step in linking the country with the Atlantic, so that Nicaragua could fulfil its mission of being the country of transit on the continent.

Nicaragua was represented at the consultative meeting of foreign ministers at Panama on Sept. 23, 1939, held in agreement with the accords reached at Buenos Aires and Lima, in which continental solidarity had been declared to maintain peace on the American continent and to help re-establish peace throughout the world.

On March 1, 1940, the Military academy of Nicaragua began to function under the direction of U.S. Col. Charles J. Mullins, Jr., with 100 young Nicaraguans who had graduated from centres of secondary education. Soon the results of this training and the manifestation of discipline by the cadets came to be appreciated and received general approval.

In April 1940 a convention for the canalization of the San Juan river was signed by the representatives of Nicaragua and Costa Rica, Dr. Manuel Cordero Reyes and Tobías Zúñiga Montúfar, respectively, in accordance with the protocol signed in Washington, D.C., in 1939.

War Measures.—On Dec. 9, 1941, two days after the attack on Pearl Harbor, the national congress declared war on Japan and all axis powers, although it was maintained



President Anastasio Somoza reviewing cadets of the Nicaraguan military academy in 1943

in the senate that a declaration of war was unnecessary, as continental solidarity and international agreements obliged the government and people of Nicaragua in any case to counter aggression.

Nicaragua contributed materially to the victory of the United Nations by blocking the credits of totalitarian countries, confiscating their goods, and increasing its rubber production.

The United States co-operated actively in the construction of a wartime highway traversing Nicaragua from the frontier of Honduras to that of Costa Rica. A paved road of 171 mi. was also started to the Atlantic coast from a point called San Benito on the Pan-American highway to Rama, a navigable port on the Escondido river. With regard to this matter, President Somoza declared in Nov. 1942: "The construction of this highway is the result of conversations which I had with President Roosevelt in May 1939, and of later negotiations for the establishment in Nicaragua—with the financial co-operation of the United States government—of transport facilities between her eastern and western regions. It is stipulated in this agreement that the U.S. government shall contribute all the funds necessary for construction."

In 1943 the two parties in power tried to amend the constitution to make the re-election of the president possible if the state of war continued, and to incorporate the Atlantic Charter. The country opposed the measure violently, and Somoza vetoed the proposed amendment in 1944 under a threat of the people to hold a general strike.

In April 1944 the government sent two delegates to the parliamentary congress in Santiago de Chile, one of whom proposed the Pacific Charter, much commented upon in the South American press. Nicaragua was also represented at the Conference of Chapultepec on Feb. 21, 1945, and

at the United Nations conference on international organization at San Francisco on April 25, 1945.

Political agitation increased during 1945 and 1946, and the opposition demonstrated against the government during a state visit by President Ríos of Chile. Repression by the government of the leaders of ideological movements of subversive character was commented upon by the constituent assembly of Panama, and was made the object of attention by Foreign Minister Eduardo Rodríguez Larreta, of Uruguay, who maintained that the indivisibility of peace and the principle of nonintervention did not give unlimited protection to repeated violation by any republic of the fundamental rights of man and citizen; or that the disregard of commitments freely made by a state with regard to external and internal obligations did not entitle it to a place in international co-operation. The Nicaraguan foreign office informed Larreta that an internationally accepted definition of the democratic system of government and of the elementary rights of man and citizen was needed.

The electoral problem was strongly influenced by the political atmosphere. A group called the Independent Liberal party was formed by members of the National Liberal party; it united with the Conservative party and endeavoured to conclude an agreement under which both were to nominate an independent liberal citizen as presidential candidate, and divide equally the representation in the national congress. The National Liberal party nominated Dr. Leonardo Argüello as its candidate, and the Independents Dr. Enoc Aguado. The latter nomination was subject to approval by the conservative directorate. Before these agreements the liberals and conservatives made joint representations to be granted the supervision of the elections, which was denied to them.

On Aug. 23, 1946, President Somoza, making use of permission again granted to him for three months by congress, went again to the United States. Peace continued to rule in the country, and the whole public administration was influenced accordingly. There were rumours of a possibility that all parties might settle on a single candidate for the presidential elections of Feb. 1, 1947.

Social Progress.—During the decade 1937–46, the government worked intensively to improve social and material conditions. Social improvement was based on a reform in all branches of public instruction, and an increase in the number of primary, secondary and other schools. The Central university of Nicaragua was created, with its seat in Managua; the Normal school for men was founded and named for Franklin D. Roosevelt. In Jinotepe, department of Carazo, a modern building was constructed to house a model school to satisfy all pedagogical needs.

On Feb. 1, 1945, the government promulgated its labour code, which was sent by the executive to the national congress for its study and approval. This work was designed not only to grant labour fundamental rights but to regulate the fulfilment of labour's obligations.

An important event of 1946 was the celebration on July 24 in Managua, of the first centenary of the date on which the congress bestowed the title of city on the capital.

By the end of the decade, the country was well supplied with a network of roads. The capital was joined with the south as far as the border of Costa Rica by a road 90 mi. long, passing through the cities of Diriamba, Jinotepe, Nandaime, Ochomogo and Rivas. To the north it was united with Honduras by a highway of 146 mi., running through several cities of importance, such as Estelí, an important agricultural and cattle centre. From Sébaco, halfway along this highway, an important road branched

Nicaragua: Statistical Data					
Item	Value (000's omitted)	1938	1940	1943	Amount or Number
		Amount or Number 1 Cordoba= 19.2 cents U.S. (11d.)	Value (000's omitted) Amount or Number 1 Cordoba= 20 cents U.S. * (11d.)	Value (000's omitted) Amount or Number 1 Cordoba= 20 cents U.S. (11¼d.)	
Exchange rate					
Finance					
Government revenues	\$1,324(£271)		\$3,997(£1,044)	\$8,228(£2,039)	
Government expenditures	\$1,043(£213)		\$3,997(£1,044)	\$8,244(£2,043)	
National debt	\$2,098(£429)		\$1,450(£379)	\$5,671(£1,405)	
Transportation					
Railroads		420 mi.			
Communication					
Telephones		1,389	1,509*		
Radio sets . . . . .		...	4,000*		
Minerals					
Gold		44,301 oz.	64,356 oz.		
Crops					
Sugar cane		203,684 tons			
Coffee		15,000 "	10,864 tons§		
Cotton		10,593 "	1,190 tons		
Forest products					
Timber		15,447,216 bd. ft.§			
Dyewood		462,461 bd. ft.§			
Manufactures					
Sugar		33,069 tons§			
Exports—Totals	\$5,884(£1,204)		\$9,494(£2,479)	\$15,440(£3,827)	
Coffee	\$2,031(£415)	16,000 tons	\$2,094(£547)	(£3,435(£851))	13,000 tons
Gold (concentrates)	\$1,551(£317)	49,000 oz.	\$5,758(£1,503)	\$7,735(£1,917)	243,000 oz.
Bananas	\$777(£159)	1,950,000 bunches	\$446(£116)	1,156,000 bunches	...
Imports—Total	\$5,120(£1,047)		\$7,052(£1,841)	\$13,530(£3,353)	80,512 tons
Cotton manufactures	\$1,228(£251)	1,560 tons	\$1,044(£273)	\$3,220(£798)	2,258 "
Machinery and apparatus	\$790(£162)	960 "	\$1,923(£502)	\$1,590(£394)	4,619 "
Iron and steel manufactures	\$416(£85)	2,779 "	\$654(£171)	\$860(£213)	5,900 "
Education					
Primary schools		796	943		
Students		53,184	63,380		
Secondary schools		8	11		
Students		849	2,750		
Commercial schools . . . . .		...	38		
Students . . . . .		...	1,714		
Universities . . . . .		...	3		
Students . . . . .		...	722		

*1941.

†Fiscal year.

‡Budget estimate.

§Exports only.

||1942.

off on the side of Matagalpa, joining that city with Managua.

Work on sanitation was intensified throughout the country with the co-operation of the United States government. A building for the general health administration and its numerous sections and subordinate agencies was erected in the capital, as well as other units in all the 15 political divisions of the republic.

In connection with this aspect of Nicaragua's progress, the country was aided materially during the decade by the co-operation of President Roosevelt, to whom the Congress of the Republic gave the title "Benemérito de las Américas" (Worthy of the Americas), on April 14, 1945, in recognition of his work for world peace and his generous undertaking to unite the Americas.

On Nov. 23, 1943, the Instituto Indigenista Nacional (National Institute for Natives) was founded with its seat in Managua, and as an associated agency of, the Instituto Indigenista Americano (American Native Institute). The Government announced its intention to study the Indian problem in Nicaragua in all its aspects with the intention of improving the living conditions of the Nicaraguan Indians. (C. A. Ms.)

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Nickel

World production of nickel increased by nearly a half under World War II demands, but even so a chronic shortage of supply remained. Fortunately, only a small part of the output was located in countries that fell into axis hands—including the relatively small amounts in Burma, the Netherlands East Indies, Norway and Greece, and a portion of the soviet output. Furthermore, much of the production capacity of these nations was reported de-

stroyed, and the axis secured little benefit in the way of nickel recovery. Petsamo, the former Finnish development of International Nickel, later known as Patchange, was in soviet Russia's hands, and the former small soviet output in other areas was materially increased. The domestic Norwegian output was continued under German occupation, but without the benefit of the Falconbridge matte formerly shipped from Canada, the output was small. Soon after the German surrender, the Falconbridge matte, which had been treated in Canada by International Nickel during the war, was again sent to Norway.

Table I.—World Production of Nickel
(Short tons)

	1937	1939	1941	1943	1945
Burma	1,359	1,015	?	?	?
Canada	112,453	113,053	141,129	144,009	121,978
Cuba	—	—	—	2,679	12,015
Greece	1,055	1,473	?	331	?
New Caledonia	12,787	11,712	11,459	8,128	4,771
Norway	967	1,219	1,000	636	?
U.S.S.R. (Est.)	2,200	?	?	12,300	14,800
United States	219	394	660	642	1,155
Total	132,400	134,500	178,600	183,000	168,600

The Canadian output, representing 85% of the prewar total, was increased by one-quarter during the war, but because of increased outputs elsewhere, dropped to 79% of the total in the peak year 1943, and to 72% in 1945. Production was well maintained in New Caledonia until 1941, and then suffered a sharp decline. The loss of the company's smelter in France made it necessary to ship the matte to the United States for treatment, and shipping difficulties were a heavy handicap. With the close of the war, it was expected to revert to final treatment in France, or possibly to erect a refinery in New Caledonia. Financed by the Reconstruction Finance corporation, and operated by a subsidiary of the Freeport Sulphur company, nickel production was started in Cuba in 1943, developing to an output of 12,015 tons in 1945. The postwar disposition of this plant was still to be determined.

The United States had no prewar output of nickel outside of a few hundred tons recovered as a byproduct in the electrolytic refining of copper, and war production from primary sources was even smaller; nor was secondary recovery of much assistance. For all practical purposes, the United States remained dependent on imports for its nickel supply, as is indicated in Table II.

Table II.—Nickel Supply in the United States
(Short tons)

	1937	1939	1941	1943	1945
Production	219	394	660	642	1,155
Secondary recovery	2,400	2,920	5,313	6,917	6,483
Imports*	54,438	64,796	124,130	141,249	122,528
Exports*	4,473	10,167	7,125	9,464	3,876

*Includes gross weight (not nickel content) of ore, matte, oxide and alloys.

The nickel content of imports was estimated at 118,293 tons in 1944, and 107,433 tons in 1945, the latter including approximately 87,600 tons from Canada, 4,400 tons from New Caledonia, 12,200 tons from Cuba and 3,200 tons from England.

Primary nickel consumption in the United States was reported at 96,252 tons in 1945, with year-end stocks of 10,883 tons at consumers' plants and 399 tons in transit; Metals Reserve stocks included 18,956 tons of metal in various forms. Consumption was distributed as follows: steel and cast iron 58,570 tons, nonferrous alloys 26,401 tons, high temperature and resistance alloys 3,951 tons, electroplating 6,368 tons, other uses 962 tons. (G. A. Ro.)

Nicola, Enrico de

De Nicola (1877–), Italian statesman, was born Nov. 9, 1877, in Naples and was graduated from Naples University at the age of 18 with a law degree. He was admitted to the bar and soon established a reputation as one of Italy's foremost criminal lawyers. Elected a deputy of the Italian chamber of deputies in 1909, he was re-elected in 1913, 1919 and 1921, and was president of the chamber of deputies from 1920–23. When the fascists elected De Nicola to the chamber on their ticket, he refused to take his seat and retired from politics in 1924.

In the summer of 1946, neither of the two leading candidates for the presidency of the provisional republic—Vittorio Orlando, former premier of the pre-Mussolini era, and Benedetto Croce, eminent philosopher—could muster enough votes to win; therefore the name of De Nicola, a compromise selection, was submitted to the assembly and he was elected by 396 out of 504 votes. He was slated to hold office until the elections of 1947, when a permanent president would be chosen.

Nicotinic Acid (Niacin)

See BIOCHEMISTRY; CHEMOTHERAPY; MEDICINE; VITAMINS.

Niemoeller, Martin

Niemoeller (1892–), German theologian, was born at Lippstadt in Westphalia on Jan. 14, 1892. Distinguishing himself during World War I as a submarine commander, he later turned to farming and then to theology, and eventually became pastor of the wealthy Dahlem parish of west Berlin. As an ardent nationalist and opponent of communism, Niemoeller participated in the Kapp putsch following World War I, which was directed against the socialist government in Berlin. Hostile to the Weimar republic, Niemoeller at first welcomed National Socialism and even joined the party, but in the

summer of 1933 events turned him into a defiant opponent of the Nazi effort to bring the Lutheran church under the domination of the totalitarian state. He continued to preach courageously at Dahlem against Nazi totalitarian control over the church until July 1, 1937, when he was arrested and imprisoned. Finally brought to trial in March 1938 on a charge of sedition, he was released, but was immediately rearrested by the secret police and was placed in a Berlin prison and then in the concentration camp at Dachau. Liberated by U.S. troops in May 1945, he was elected president of the executive council of the Confessional Protestant church in April 1946.

Nigeria

See BRITISH WEST AFRICA.

Night Clubs

During World War II, in cities like New York, a port of embarkation for troops and a crossroads for traveling servicemen and their families, thousands of people who had never ventured inside a night club before, found themselves at a ringside table, eating a chicken dinner, watching a floor show, dancing to a name band—and enjoying it. By 1942 business was up 25% to 100% over 1941. El Morocco kept its zebra-striped interior open for the first summer in its history. The Stork Club reported business 40% over the previous year. Boston's Club Mayfair and Satire Room were packed, and The Ranch in Seattle reported business almost doubled. Many socialites and some of the French names on the menus disappeared, but 1,200 people, mostly factory workers, were jamming Detroit's Bowery nightly.

Of course, there were troubles. Many clubs along the highways and byways had to close because of gas rationing. On April 1, 1944, the 5% federal tax was raised to 30%. Business declined as much as 75%, many clubs closed, and thousands of entertainers were dismissed. But returns on the new tax were disappointing, and three months later it was reduced to 20%. Business jumped back with amazing rapidity and kept on climbing. In 1945 the curfew was imposed, but the main result was a cut in the number of shows—probably a happy circumstance in view of rising entertainment costs.

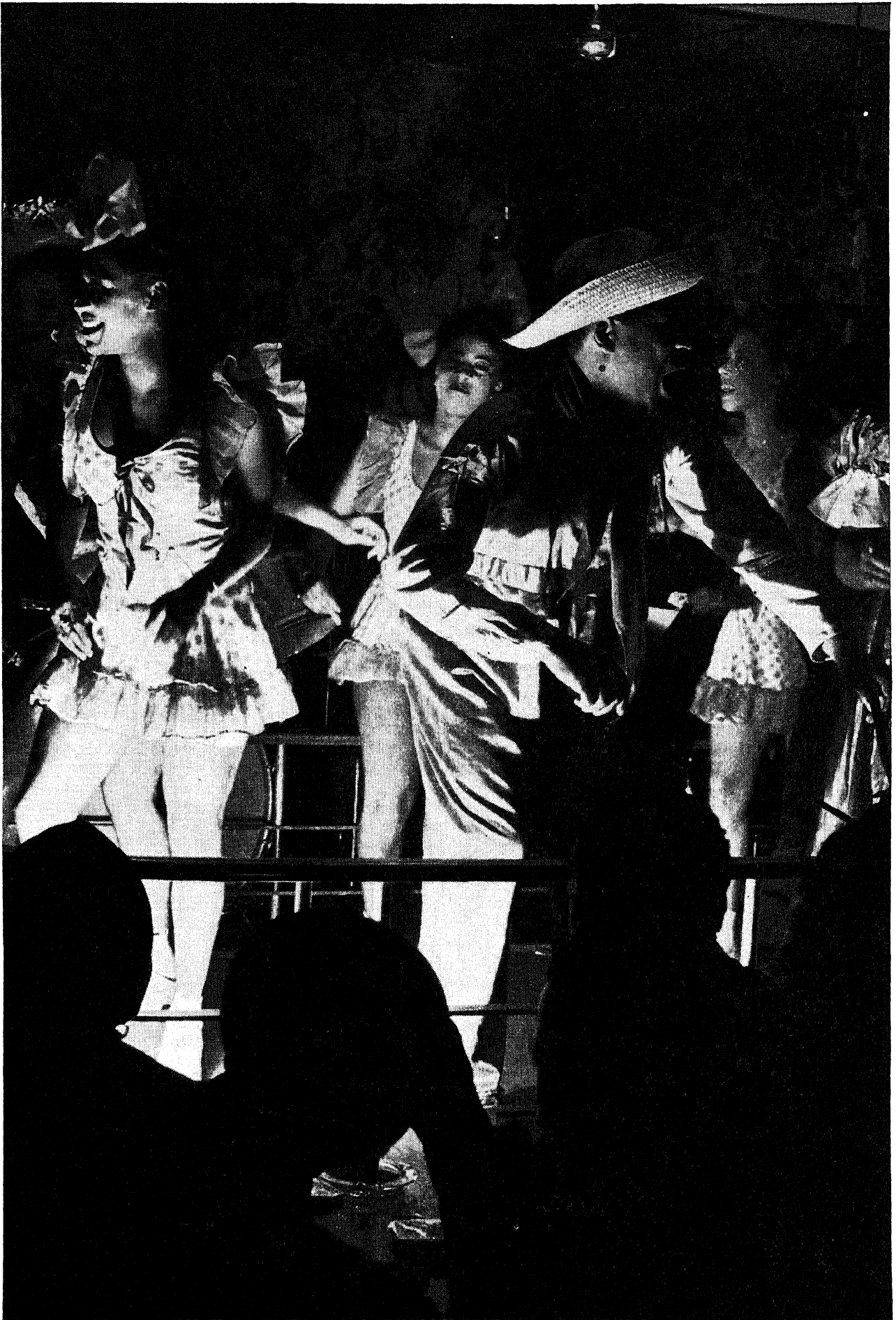
In 1946 night club business had fallen off 25% to 30% from its wartime peak, but generally operators were not complaining. The former \$600,000,000 industry was still probably close to \$1,000,000,000.

New York.—In 1937, only the playboy tipped the captain, but in 1946 even a high school youngster fumbled for his dollar. And whereas in 1937 the average audience age was 30 or over, 18-year-olds were numerous in 1946. Formal dress disappeared during World War II and reappeared only slowly, even at the ringside tables. And many out-of-towners who formerly came in occasionally were now regular patrons on "yokel night" (Saturday).

Entertainment had changed little. The ingredients of the popular show remained the same—good singing, fast dancing, a funny comedian and colourful costumes. But where shows used to be revised every six or eight weeks, they ran six months or more by the end of the decade.

There was a shortage of talent, occasioned not so much by the war as by the fact that the disappearance of vaudeville left no training ground for youngsters. There were

Floor show at a Harlem night club on Lenox Ave., New York city. During the years of World War II, night club entertainers created a tempo to match those of war workers, servicemen and women on furlough and a general public stirred by the restlessness of the times



only the inexperienced or the well-known star; and radio and motion pictures competed for what was available. Milton Berle received \$7,500 a week plus a percentage, compared with \$1,500 in the '30s. Name bands came high too. Content in the '30s to play a night club because of "remotes" (nationwide hookups which guaranteed a following in the hinterland), in 1946 they could make their name through their recordings.

Other costs were up proportionately. Musicians and chorus girls formerly worked three shows, seven nights a week. By 1946 it was two shows for six nights. The chorus girl who earned \$35 in 1937 made \$65 in 1946. An act that would have cost \$200 then brought \$1,000 in 1946.

But the customers were paying. Drinks jumped from 50 cents or 60 cents before the war to 75 cents and up. A bottle of Scotch that would have brought \$12 in 1937 brought \$20. The average cheque of the late '30s was \$3; in 1946 it was \$4.50 to \$5.50. And there were many more cheques.

Clubs in 1946 were filled for both dinner and supper. Night after night people were turned away. It wasn't unusual for the Copacabana or Zanzibar to gross \$50,000 a week.

Chicago.—The "Peck's Bad Boy" of nightlife, Chicago maintained its reputation for the daring and the debauche during the decade. There was a mushroom growth of the strip-tease emporium. After 1937 six major night clubs and a dozen or more lesser ones—all dedicated to the art of defoliation—sprang up to challenge the popularity of the long-famous 606 Club and McGovern's Liberty Inn. Among the newcomers were the L&L Café, Club Flamingo, and the Playhouse, all goldmines.

The cost of food and drink at Chez Paree doubled during the decade, not to mention the jump in gratuities. Two bids were made to match it for first place honours—the Latin Quarter and Rio Cabana—but neither came close. The Empire Room still ranked highest in entertainment value as it did a decade before, and the Hotel Sherman's College Inn, renamed the Panther Room, was still the name band room of the city.

The main change in Chicago was in the audience. Society withdrew except for infrequent appearances at the Pump Room or Buttery or the Blackstone's Mayfair Room; a war-born cafe society replaced it—coarse and incautious with its cash.

Detroit.—In 1937 a dozen or so night clubs flourished in the downtown area of Detroit, most of them run by former speakeasy proprietors. But few of them made money in the club business. The floor show, \$1.50 dinner and 35-cent drink were come-ons for the gambling games that turned loss into profit. That era ended in 1940 with the start of the now-famous Graft grand jury that sent a Detroit mayor to prison and a grand juror to the U.S. senate.

But Detroit was never a night club town. The mortality rate remained high. Some closed for financial reasons—others because the Michigan Liquor Control commission lifted their licence for a minor infraction of the rules. One huge and beautifully decorated club changed hands seven times after Prohibition days, when it was a dance hall. Only two clubs had operated under the same management since 1937—one a neighbourhood establishment, the other Frank Barbaro's Bowery (located in suburban Hamtramck, however).

Miami.—The decade saw the night club business of Miami change from a small sociable trade to a big-volume,

heavy-spending business during the war, but by the end of 1946 it was slowly slipping back to its prewar status. There was a big decline in the late business. In 1937, the third show started around 2:30 a.m., but the curfew accustomed people to earlier hours, and by 1946 there were usually only two shows.

As in Detroit, there was a big turnover of operators. Of 30 clubs in Miami and Miami Beach in 1937, only three of the operators ran clubs there in 1946. Many clubs had changed hands several times. During the war, numerous dine-and-dance halls with name bands sprang up for servicemen.

There was a trend toward more elaborate entertainment, probably forced by Lou Walters and his Latin Quarter. Walters sold out to his partner and produced shows for the Terrace Club in the winter of 1945-46.

The city of Miami enacted a 25-cent head tax on night club attendance, but this seemed to have little effect on business at the Copacabana, the Beachcomber, the Little Palm, the Clover and other clubs.

Los Angeles.—The fact that Los Angeles was still running a poor second to Las Vegas as a night spot in 1946 was blamed on the midnight curfew still in effect. Los Angeles clubs fell into three categories: the glamour spots, hot spots and tourist clubs. Gasoline rationing, curfews and blackout regulations caused high mortality among the expensive glamour spots during the war. Only one remained open around Hollywood and Vine—the Mocambo. Others—Ciro's, the Troc and the like—were in full swing again in 1946 but not so profitable. The small hot spots, on the other hand, flourished during the war on the servicemen's trade; the Bandbox, Streets of Paris, Swanee and the rest featured hot, loud music and specialty acts, and were still faring pretty well at the end of 1946.

Tourist spots—Earl Carroll's theatre restaurant, Florentine Gardens, Slapsie Maxie's—were complaining of the curfew too, but Earl Carroll, whose \$2,500,000 place was the most lavish built after 1937, and who hadn't changed his show for two years had already announced plans for a \$5,000,000, 7,000-seat theatre-broadcasting studio-night club building.

London.—Because of the government's early curfew on the sale of drinks in licensed premises, there were still no night clubs, strictly speaking, at the end of 1946. Rather they were clubs where members paid initiation fees and dues and had their own liquor served all night. They became popularly known as bottle parties.

Once the vast floating population of money-loaded Allied soldiers departed, British night life slipped back to its prewar ways. Sixty per cent of the customers were wearing black ties and long dresses. Champagne, the night club drink of 1937, had dropped from its wartime price of £9 per bottle to a government-controlled £3 and was slowly climbing back to favour; but in general, drinking habits had switched from wines to spirits. Cuban bands had a great burst of popularity during the war, but proprietors believed the straight dance band was returning in the postwar years.

Business slackened after the war; the general atmosphere was about the same as in 1937 but there was less *joie de vivre* and more respectability in the night spots. Middle class provincials and tired businessmen were bringing their wives and daughters.

Paris.—There was a sameness and a difference, too, in Paris. There were changes in management and clientele, a little in entertainment, quite a bit in tone and enormous ones in the cheque (*la douloureuse*) but the leaders of 1937 were still the leaders of 1946—Monseigneur, Shehera-



Night life in Paris regained prewar levels of social gaiety in 1946. Patrons at the Lapin Agile, Montmartre, are shown listening to one of their group singing a popular French tune

zade, Casanova, Le Boeuf sur le Toit, the Florence.

The Bal Tabarin still packed them in with the same specialties—young nudes and grand-staircase production numbers—public dancing on the raised floor to the same braying band—and the can-can. Moulin Rouge, slowest to reopen, was practically unchanged from prewar days. Young Americans packed the Lapin Agile precisely as they did in 1937. The *boîtes* like Eve, Chantilly and the Paradise, still had the old patter. And the Boeuf's and Monseigneur's drawing cards were still the slickest dance orchestras in Paris. Casanova and Sheherazade still depended on the dim, *intime* atmosphere suited to seduction or despair. The only changes seemed to be an epidemic of acrobats of all kinds and a development resulting from war regulations: *boîtes* used to specialize in small dance orchestras. When the German occupying authorities banned dancing, the first violin started the old Hungarian routine of playing into the lady's ear. In 1946 the whole orchestra gathered around a single table for a few numbers, drowning out conversation and drinking the customer's health in his champagne.

But there were troubles. The number of *boîtes* had about trebled during the decade, but the number of customers had only doubled and there had been numerous failures. The war and immediate postwar period brought all sorts of headaches: first complete closure, then the re-assembling of scattered talent, scratching for occupying army permissions and a very uncertain supply situation. Then came blackouts, strictly enforced curfew regulations, bombings, price rises. Then the liberation, another shutdown, purges, new permissions and shortages. The autumn of 1944 brought electricity famine, early closing regulations, military police cleanups and salary increases. By

late 1945 things were improving, but even late in 1946 profits were small compared with those of 1937.

French night club finances continued to be based principally on champagne sales. In 1937, proprietors could buy champagne for 20 francs a bottle and sell it for 100 francs and up. Recognized brands cost 35 francs or 40 francs and sold at over 200 francs. In 1946 rationed champagne filled only 10% of their needs and poor black market brands cost 600 francs, good brands 1,000 francs. But it was sold for only 1,200 francs and 1,400 francs respectively. The average gross profit margin had dropped from 400% or 550% to between 40% and 60%. Customers did not drink as much, either. In 1937 a party of four might drink four, five or six bottles in an evening, but by 1946 it was from one to three bottles.

Clientele changed rapidly through the war years. The wehrmacht troops were not very gay, behaved in orderly manner and seemed to look for forgetfulness. The S.S., on the contrary, were arrogant, noisy and slightly sadistic. The G.I.s were rowdy, bawdy and noisy. By late 1946 soldiers were rare. Audiences had returned to prewar status but another element had been injected—the new black market well-to-do—a strange mixture of crook-types and enriched shopkeepers with shifty eyes, most of whom looked rather bored but didn't know what else to do with their new money.

Buenos Aires.—The big Tavaris and the swanky Alvear Palace hotel roof were still big and swank. Dance cabarets had sprung up all along Lavalle street. The biggest new entry since 1937 was the building of the great Casino at Mar del Plata, reputed to have more gaming tables than Monte Carlo. But unlike almost any other place in the world, prices were low, Argentina had an abundance of goods and almost no inflation. It was difficult in 1946 to spend more than \$1.25 on a good dinner in Buenos Aires,

and wines were 25 to 35 cents a pint, whisky 50 to 60 cents.

Rio de Janeiro.—Things in Rio were vastly different. Reputedly the city of night life, Rio never had much to offer other than \$3,000,000 casinos—the Urca, Atlantico and Copacabana and, out at gay Petropolis, the big new name of the war years—the fabulous \$13,000,000 Quitandinha. Each casino had its grille or *boite* with loud music, two shows seldom changed, a tiny dance floor and poor food. But gambling rather than conviviality made Rio's nightlife; and casinos were based on their gambling rooms. Indeed, gambling was Brazil's most profitable business; \$50,000 nightly was not an unusual "take" for the casinos and contributed a major part of the government's income.

But Brazil, after a tremendous war boom, with vastly more money than goods in spite of the fact that 75% to 90% of its population was too wretchedly poor ever to have gone into a casino, had a terrific inflation. Especially during 1945-46, when prices skyrocketed. In the interests of sounder finance, the Brazilian government in May 1946 decreed the end of licenced gambling and thus brought an end to Brazilian nightlife.

Mexico City.—In Mexico City there were still the cabarets where the female hostesses drank copious quantities of coloured water and got a cut on the bar trade. In the capital were hundreds of such places topped by big gaudy Waikiki and Cien Flores.

Three of the clubs were small, intimate, dine and dance spots with only occasional entertainment—Sans Souci, opened in 1944, Casanova, catering to native cafe society, and the expensive Minuit.

The two leaders in the field in 1946 were radically different types. The older El Patio, biggest and almost the only club of note in Mexico City before the war, remained a place of the people. The music-hall type, it continued to draw on the upper middle class Mexican. Run in a friendly fashion by a former waiter who made a fortune in tips at the old El Retiro restaurant, it catered to properly chaperoned young Mexican couples, to banquets, parties and fiestas—at moderate prices.

The biggest change of the war years in Mexico City's night life was the entrance of Blumey Blumenthal, who went down from the United States in 1940 and was depressed at what he saw. Here was a country on the threshold of its industrial age and entering a tourist boom, with no place to go but El Patio, neither lively nor distinguished nor expensive. Blumenthal, who had never operated a restaurant or nightclub before, took over the poorly-run, unprofitable Mayan Room restaurant in the Hotel Reforma, and in 1941 *Ciro's* was born. The minimum charge was set at 100 pesos on opening night. But *Ciro's* was an immediate success, and all Mexican night club prices later rose.

(S. By.)

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Nimitz, Chester William

Nimitz (1885-), U.S. naval officer, was born Feb. 24, 1885, in Fredericksburg, Tex., and was graduated from Annapolis in 1905. He was chief of staff to the commander of the Atlantic fleet's submarine force during World War I and was promoted to rear admiral on June 23, 1938. On Dec. 17, 1941, after the surprise attack on

Hawaii Adm. Nimitz was made commander in chief of the U.S. Pacific fleet with the rank of admiral. The fleet, weakened by the blow at Pearl Harbor, was a mere skeleton when Nimitz assumed his post at Pearl Harbor on Dec. 31, 1941. Nimitz quickly reorganized his combat teams and strategy and then built up a group of leaders, including Adms. William F. Halsey, Marc A. Mitscher, Richmond Kelly Turner, Raymond Amos Spruance and Thomas Cassin Kinkaid. Nimitz's command of the Pacific ocean area placed army and marine units as well as naval forces within his jurisdiction. Under his command, U.S. armed forces conquered the Solomons in 1942-43, the Gilbert Islands in 1943, the Marshalls, Marianas, Palaus and the Philippines in 1944 and Iwo Jima and Okinawa in 1945. Nimitz attended the Japanese surrender ceremonies aboard the battleship U.S.S. "Missouri" in Tokyo bay on Sept. 2, 1945. In December of that year he was promoted to the five-star rank of fleet admiral of the U.S. navy, and succeeded Adm. Ernest King as chief of naval operations.

Nitrogen, Chemical

World War II brought extensive developments in the replacement of natural sodium nitrate from Chile by other forms of chemical nitrogen, especially compounds synthesized from atmospheric nitrogen and by-product nitrogen from the coking of coal. During the war, the agricultural and industrial consumption of nitrogen doubled, while military consumption increased ten fold, rising to 600,000 tons a year, compared with a total consumption of 450,000 tons in 1939.

While there were marked increases in imports of Chilean nitrate and in production of by-product nitrogen, the bulk of the increased demand was supplied by synthetic compounds.

By-product ammonia output in the United States increased from 149,200 tons in 1939 to 224,423 tons in 1943, and 236,226 tons in 1944, declining to 218,680 tons in 1945. About one-sixth of the output was sold as ammonia, and the remainder converted into ammonium sulphate. Data on the output of synthetic ammonia were available only after 1943—543,804 tons in 1943; 544,156 tons in 1944; 548,655 tons in 1945; and 263,871 tons in the first half of 1946.

Imports of Chilean nitrate rose from 676,409 tons in 1939 to a peak of 899,785 tons in 1942, declined to 712,434 tons in 1944, and increased to 849,888 tons in 1945. Small amounts of mixed sodium-potassium nitrate were produced as a by-product in the recovery of sodium nitrate; imports of this mixture were 55,164 tons in 1939, but declined to 9,407 tons in 1944 and none in 1945. The chief imports of other nitrogen compounds were calcium cyanamide, ammonium sulphate and ammonium phosphate, but the sulphate receipts were partly offset by exports.

There were no data on the amounts of chemical nitrogen going into its various uses. Normally fertilizers and the chemical industry were the major consumers. During the war years the demand for chemical uses was greatly expanded by the large amounts of explosives required for munitions.

(G. A. Ro.)

Nitroparaffins

See CHEMISTRY.

NLRB

See NATIONAL LABOR RELATIONS BOARD.

NMB

See NATIONAL MEDIATION BOARD.

Nobel Prizes

There were no awards of Nobel prizes for 1940, 1941 and 1942, but the annual awards were resumed in 1944 with announcement of prize winners for that year and for 1943. A list of the prize winners in the five categories during the decade 1937-46, except for the early years of World War II, follows.

Physics.—The 1937 prize was divided between Clinton J. Davisson of New York and George P. Thomson of London, for experimental discovery of interference phenomena in the irradiation of crystals by electrons; 1938, Enrico Fermi of Rome, for proving the existence of radioactive elements produced by bombardment with neutrons, and for his discovery of nuclear reactions produced by slow neutrons; 1939, Ernest O. Lawrence of the University of California for his work in atom-smashing and his invention of the cyclotron. The prize for 1943 (awarded in 1944) went to Otto Stern of the Carnegie Institute of Technology for his research in the magnetic properties of protons; 1944, Isidor I. Rabi of Columbia university for his work with magnetism in atomic particles; 1945, Wolfgang Pauli of Switzerland for atomic studies; 1946, Percy W. Bridgman of Harvard for research on atmospheric pressure.

Chemistry.—The 1937 prize in chemistry was awarded to W. N. Haworth of Birmingham, for research on carbohydrate and vitamin C, and to Paul Karrer of Zurich for research on carotinodes and flavins and vitamins A and B₂; 1938 (awarded in 1939), Richard Kuhn of Germany for his work on vitamins; 1939, divided between Adolph Butenandt of Germany and Leopold Ruzicka of Switzerland for their research in sex hormones. The 1943 chemistry prize (awarded in 1944) went to Georg von Hevesy, Hungarian in Sweden, for his research with isotopes; 1944, Otto Hahn of Germany for his work in atomic fission; 1945, Artturi Wirtanen of Finland for his work in conservation of fodder. In 1946, half the award went to James B. Sumner of Cornell university for research in enzymes and the remainder was divided equally between John H. Northrop and Wendel M. Stanley of the Rockefeller Institute for Medical Research, for their work on viruses.

Physiological Medicine.—The 1937 prize was awarded to Albert von Szent Gjörgye University of Szeged, Hungary, for research in connection with vitamin C; 1938 (awarded in 1939), Corneille Heymans of Belgium for his research in the role of the sinus aorta in breathing; 1939, Gerhard Domagk of Germany for his discovery of prontosil. The 1943 prize, awarded in 1944, was divided between Edward A. Doisy of St. Louis university school of medicine, and Henrik Dam of Denmark for discovery of the nature of vitamin K. In 1944, the prize was split between Joseph Erlanger of Washington university, St. Louis, and Herbert S. Gasser, director of the Rockefeller institute, New York, for their studies of nerve threads. In 1945, the prize was divided among three men—Sir Alexander Fleming, discoverer of penicillin, and two of his co-workers, Sir Howard Walter Florey and Ernest Boris Chain, a German refugee in England. In 1946, the prize was awarded to Herman J. Muller of Indiana university for his work in genetics.

Literature.—1937, Roger Martin du Gard, French novelist and critic; 1938, Pearl Buck, U.S.A.; 1939, Frans Eemil Sillanpää of Finland. After 1939, no prizes were awarded until 1944, when Johannes V. Jensen of Denmark, novelist and poet, was honoured. In 1945, the prize was awarded to Gabriela Mistral (pseudonym of Lucila

Godoy), Chilean poetess, and in 1946 to Herman Hesse, German-born Swiss citizen.

Peace.—1937, Viscount Cecil of Chelwood, president of the League of Nations union; 1938, the Nansen office in Geneva. During 1939-43, there were no prizes awarded. In 1944, the prize went to the International Red Cross for its war work, in 1945 to Cordell Hull, U.S. secretary of state from 1933 to 1944. In 1946, the prize was divided between John R. Mott, U.S. evangelist, and Emily Greene Balch, honorary president of the Women's League for Peace and Freedom. (See also PULITZER PRIZES.)

Noel-Baker, Philip John

Noel-Baker (1889-), British statesman, was born Nov. 1, 1889, the son of a member of parliament. He attended Cambridge university, receiving his degree of master of arts in 1913. Before World War I, Noel-Baker had left the Liberal party to join the Labour party. During the war, he drove an ambulance for the Friends' Ambulance unit, serving in the front lines in France and Italy, and was decorated for valour by the British and Italian governments.

He was a member of the British delegation to the Paris peace conference in 1919, captained the British Olympic team in 1924 and was professor of international relations at the University of London, 1924-29. Elected to parliament on the Labourite ticket, he served in the house of commons from 1929 to 1931. He was returned to commons in 1936 and was appointed (1942) parliamentary secretary to Lord Leathers, minister of war transport in the Churchill coalition cabinet. After the Labourite victory in the general elections of the summer of 1945, Attlee named Noel-Baker minister of state; the latter also was made a member of the privy council.

He headed the British delegation on the executive committee of the U.N. preparatory commission and in Sept. 1945, he was named chairman of the subcommittee which prepared the tentative agenda for the general assembly.

On June 14, 1946, he was named chairman of the Labour party executive, succeeding Harold Laski and on Oct. 4, Noel-Baker was shifted to the post of air secretary, although he was retained as a delegate to the U.N.

Noguès, Auguste

Noguès (1876-), French army officer, was born in the Haute-Pyrenees department, France. He entered the École Polytechnique at the age of 21 and was commissioned as a lieutenant. He was stationed in Africa from 1908-14, saw field service in World War I and participated in the Riff campaign of 1924-26. Named resident general of Morocco in 1936 by Léon Blum, he was widely criticized for his use of the military in the suppression of strikes. At the outbreak of World War II, Noguès was made commander in chief of all French forces in North Africa. After the establishment of the Vichy regime, he pledged fealty to Marshal Henri Pétain, but in Oct. 1940 he warned both Spain and the axis countries that he would not surrender North Africa to any invading force, even if Pétain ordered him to do so. At the time of the U.S. landings in North Africa in Nov. 1942, Noguès ordered French troops to fire on U.S. soldiers debarking at Casablanca. After Allied occupation of North Africa became a *fait accompli*, however, he returned to Algiers and assertedly persuaded other recalcitrant French colonial officers to effect a compromise with De Gaulle's Fighting French armies. After the assassination of Adm. Jean Darlan, Noguès was appointed to

362 Gen. Henri Giraud's imperial war council on Dec. 27, 1942, and was retained as governor general of Morocco. In June 1943 Noguès, who was in De Gaulle's disfavour, submitted his resignation as governor general.

Nomura, Naokuni

Nomura (1886–), Japanese naval officer, was born in Kagoshima and was graduated from the Naval academy in 1907. Like his contemporaries—Toshio Shimada, Koshira Oikawa and Akira Nagano—he went through the usual mill of administrative and teaching posts before assignment to important commands. He was on the staff of the naval construction department, attended the London disarmament conference, was director of the naval submarine school and was naval attaché in both Berlin and Shanghai. He commanded a naval force in the North China seas, 1939, and became a member of Tojo's cabinet in 1941. Nomura was serving as head of a Japanese military committee in Germany which was co-ordinating axis strategy when the Japanese attacked Pearl Harbor, Dec. 7, 1941, and he left for home immediately thereafter. Nomura, who had been promoted to vice admiral in 1937, was raised to full admiral in March 1944. During the cabinet shakeup in July 1944 Tojo dropped Shimada as navy minister, replacing him with Nomura. The latter, however, held this post only a few days, relinquishing it on July 22, 1944, when Premier Kuniaki Koiso became premier. In Aug. 1944, Nomura was named to the Supreme War council and was made commander of the Yokosuka naval station. On Sept. 16, 1944, he was named commander in chief of the "supreme headquarters of the sea escort," a Japanese convoy protection service.

North Borneo

See BORNEO, BRITISH; BRITISH EMPIRE.

North Carolina

A south Atlantic coast state, popularly known as the "Old North state" or the "Tar Heel state," North Carolina is one of the original 13 states of the union. Area, 52,712 sq.mi. (3,570 sq.mi. of water); population (1940) 3,571,623, of which 974,175 (27.3%) were urban, 2,597,448 (72.7%) rural and 1,005,501 (28.2%) nonwhite. On July 1, 1944, the bureau of census estimated the population at 3,534,545. Capital, Raleigh (46,897); other cities: Charlotte (100,899); Winston-Salem (79,815); Durham (60,195); Greensboro (59,319) and Asheville (51,310).

On Jan. 7, 1937, Clyde R. Hoey (Dem.) was inaugurated as governor. The biennial legislature, meeting in January–March, rejected the proposed federal amendment empowering congress to prohibit child labour, but raised the prohibitory age for employment of children in industry to 16 years, and to 18 years for certain hazardous occupations. The first general labour law relating to maximum hours was enacted. The legislature also established an unemployment compensation commission to administer a fund, raised from taxes of 2.7% on the pay rolls of employers, from which unemployed workers might draw benefits of not more than \$15 a week for not more than 16 weeks a year. State prohibition, in effect after 1908, was ended by the establishment of a county option-state control system.

Other state officers in 1937 were: Wilkins P. Horton, lieutenant governor; Thad Eure, secretary of state; George Ross Pou, auditor; C. M. Johnson, treasurer; Clyde A. Erwin, superintendent of public instruction and A. A. F. Seawell, attorney general. During the summer there was

held on Roanoke island a celebration of the 350th anniversary of the planting, by Sir Walter Raleigh in 1585–87, of the first two English colonies in America. The celebration was featured by the periodic presentation of Paul Green's drama *The Lost Colony* and the visit and address by Pres. Roosevelt on Aug. 18.

In the regular November election of 1938, the Democrats scored their usual victory over the Republicans, re-electing Robert R. Reynolds to the U.S. senate, electing a solid block of 11 congressmen, and winning 48 of 50 seats in the state senate and 113 of 120 in the house of representatives. In March, more than 89% of the cotton and tobacco farmers in the state voted for compulsory federal crop control, which was adopted in accordance with federal law; but in December, compulsory crop control for 1939 was favoured by only 64.6% of cotton and 57.4% of tobacco farmers in the state. In the December referendum, North Carolina gave the lowest percentage for federal control of cotton; and next to the lowest for tobacco (which was defeated) in the nation.

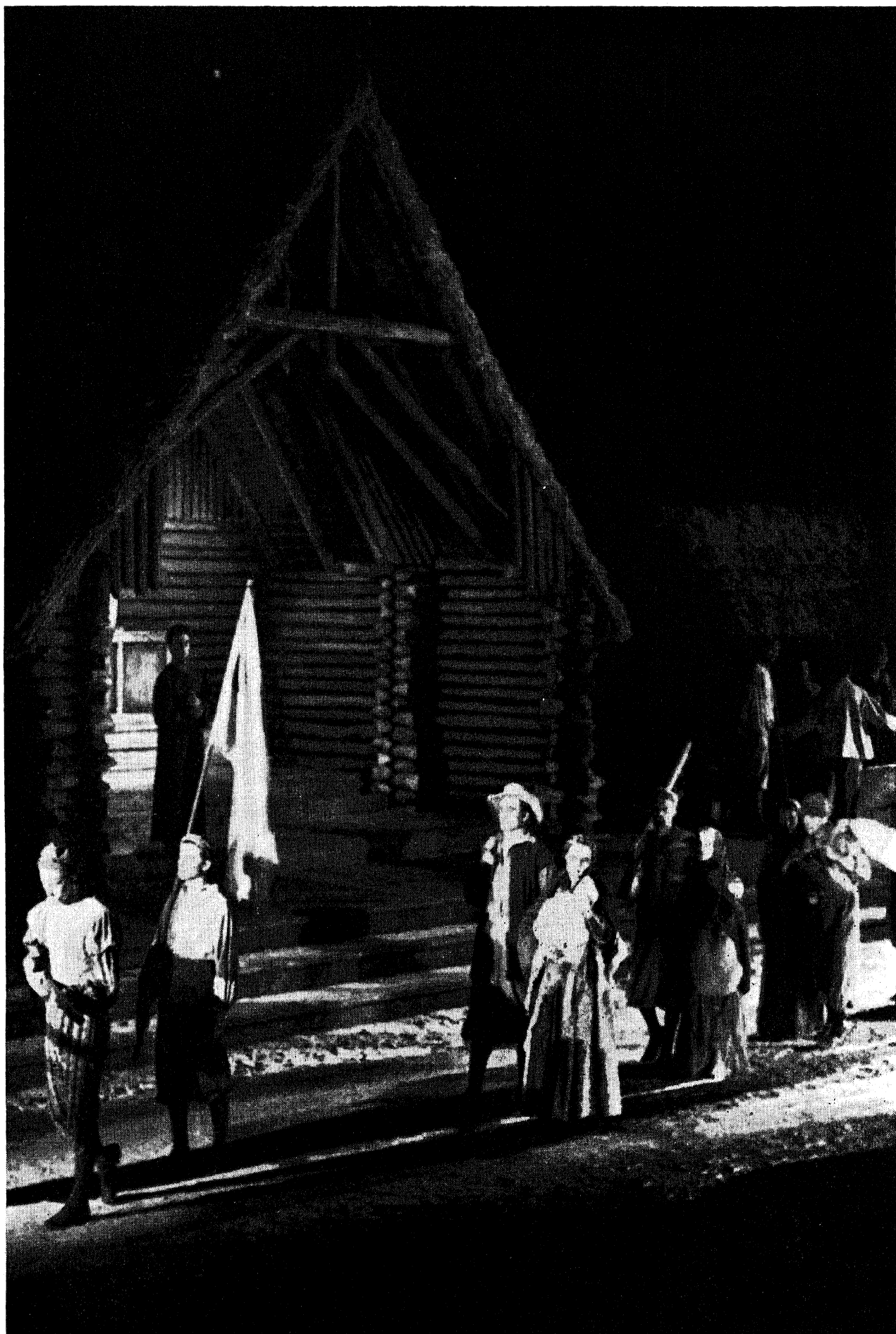
In the regular session of the legislature, Jan. 4–March 4, 1939, in response to the public demand for cleaner elections, the absentee ballot law was repealed for primaries and the use of markers and assistance to handicapped voters in primaries was restricted. The legislature adopted the revenue act as a continuing or permanent measure, except as it might be changed by subsequent legislatures. To meet the issue of graduate and professional education for Negroes, the legislature authorized two state Negro colleges to establish graduate and professional courses in liberal arts, agricultural and technical fields, law, pharmacy and library science; and in September this new policy was inaugurated in part.

In the 1940 Democratic primary, which was the cleanest and mildest in a decade, J. M. Broughton led the unprecedented field of seven candidates for the gubernatorial nomination and became the party nominee when runner-up Lt. Gov. Wilkins P. Horton declined to demand a second primary. In Nov. 1940 he was elected over his Republican opponent, R. H. McNeill, by the record majority of 413,342. R. L. Harris was elected lieutenant governor. Other state officers and congressmen (all Democrats) were re-elected. Conservative Governor Hoey sought to swing the state Democratic party to Cordell Hull for president, but the state convention in May endorsed for a third term Franklin D. Roosevelt, who carried the state in November over Wendell Willkie by the unprecedented majority of 395,382 in a total vote of 822,648.

The year 1941 was characterized by activity in national defense and war, by the inauguration of J. Melville Broughton as governor, and by the regular biennial session of the legislature which was unusually harmonious, brief, liberal and amenable to the new governor's leadership. The legislature contributed notably to educational development by doubling the support of vocational education, appropriating more liberally for public schools and higher institutions, increasing the salaries of public school teachers, adding a 12th grade to the public school curriculum, and adopting a retirement system for teachers and state employees. A 12th congressional district was created, and representation in the U.S. senate and house was reapportioned.

In the Democratic primary of June 1942, Josiah William

Re-enactment of "The Lost Colony," a symphonic drama by Paul Green presented on Roanoke Island, N.C., in 1937 to commemorate the 350th anniversary of the first English colonization attempts in America. The play described the probable fate of the second colony, whose mysterious disappearance was never solved



Bailey won the nomination for U.S. senator over Richard T. Fountain and was re-elected easily in November over his Republican opponent. In the November election, in which the vote was small, the Democrats won every judgeship, elected all 12 congressmen, including former governor and U.S. senator Cameron Morrison from the new district, and captured overwhelming majorities of both houses of the legislature. The voters also ratified two constitutional amendments providing for solicitor districts, and for the centralization of control of the public schools in one state board of education.

The first wartime legislature of North Carolina since 1865 adjourned on March 10, 1943, after a 55-day session. Notable legislative actions were the nine months' public school law, the granting of emergency war powers to the governor and council of state, the creation of a state school for delinquent Negro girls, the first authorization of state financial support for art and music, the establishment of unified administrative control of public schools, of state correctional institutions and of state institutions for mental defectives, the creation of a state postwar reserve fund of \$20,000,000, and the enactment of record maintenance appropriations with no increase in taxes. During 1943, an average of more than 300,000 young men were in training in nearly 50 military and naval installations in the state. At Kitty Hawk on Dec. 17, 1943, was celebrated the 40th anniversary of the first successful flight by the Wright brothers.

North Carolina: Statistical Data

Table I.—Education (Public)

	1936	1938	1940	1942	1943	1944
Elementary school pupils	722,911	700,672	703,597	671,614	656,265	699,965
High school pupils	165,864	181,202	205,213	206,299	201,782	133,650
Elementary school teachers	18,287	18,108	18,579	18,448	18,357	19,755
High school teachers	4,857	5,643	6,859	7,854	7,986	6,174

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1942	1943	1944	1945
Cases on general relief	6,111	5,465	4,435		2,693	2,398	2,502
Cost of general relief	\$35	\$33	\$29	\$25	\$23	\$24	\$29
Recipients of old-age pensions	31,964	35,694	37,549	39,058	35,672	33,096	32,804
Cost of pensions	\$299	\$362	\$382	\$407	\$382	\$380	\$430
Dependent children receiving aid	21,053	23,291	23,585				
Blind receiving aid	1,949	1,947	1,911	2,241	2,219	2,281	2,396

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1940	1942	1943	1944	1945
State highway mileage			11,309	11,347	11,385	11,338	11,289
Expenditure on highways	\$34,062	\$35,829	\$39,799				
Railroad mileage	4,731	4,728	4,596	4,593	4,581	4,581	4,581

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1940	1941	1943	1945
State revenue	\$93,491	\$101,619	\$144,043	\$155,535	\$210,081	\$401,575
State expenditure	\$74,709	\$63,436	\$144,835	\$146,847	\$154,388	\$389,847
State net debt	\$136,420			\$122,768	\$113,942	\$34,764
State gross debt	\$164,280	\$150,496		\$150,613	\$133,736	\$109,522
Number of national banks	43	42	44	44	44	45
Deposits of national banks	\$110,721	\$114,252	\$129,349	\$138,803	\$278,636	

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1941	1943	1945 (est.)
Income from crops and livestock	\$261,400	\$222,809	\$204,985		\$441,194	
Leading crops (bu.):						
Apples	1,628	1,120	962	1,365	499	252
Corn	45,357	47,619	44,733	52,090	51,018	55,650
Cotton (bales)	780	457	739	556	596	430
Hay (tons)	824	984	975	1,071	1,216	1,281
Lespedeza seed (lb.)	27	30	25	28,500	28,400	45,400
Oats	4,830	5,512	5,952	6,300	5,977	9,128
Peaches	1,984	1,305	1,344	2,760	252	2,172
Peanuts (lb.)	297,500	290,700	325,125	284,400	301,920	287,850
Pecans (lb.)	1,150	764	993	1,400	2,700	2,814
Potatoes, sweet	7,680	8,624	7,104	6,880	7,566	7,260
Potatoes, white	9,588	8,200	8,720	6,636	12,100	9,240
Soybeans	1,560	2,012	2,282	1,710	2,313	2,700
Tobacco (lb.)	604,590	821,207	526,505	465,235	552,612	819,790
Wheat	5,817	5,100	6,132	7,110	5,812	6,216

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	258,771	270,207
Wages paid	\$189,265	\$199,290
Value of products	\$1,384,738	\$1,421,330
Leading products (value):		
Textiles	\$496,420	\$497,741
Cigarettes	536,915	532,440
Food products	51,059	69,206
Furniture and other products	56,299	62,776

In the 1944 presidential election, Roosevelt received 527,399 votes and Dewey 263,155. Democratic U.S. Senator Robert R. Reynolds did not stand for re-election and was succeeded by former Governor Clyde R. Hoey, who defeated A. I. Ferree, his Republican opponent. For governor, R. Gregg Cherry won the Democratic nomination and defeated his Republican opponent, Frank C. Patton. L. Y. Ballentine was elected lieutenant governor. Other state officers were re-elected. In the November elections, five constitutional amendments were ratified providing that the commissioners of agriculture and labour and insurance be constitutional officers and members of the council of state, that notaries public be exempted from the constitutional prohibition against double officeholding, that the general assembly determine the compensation of the lieutenant governor, that the constitutional requirement of private examination of a wife for the validity of a deed made by the owner of a homestead be abolished, and that the state board of education consist of the lieutenant governor, state treasurer, superintendent of public instruction and ten appointees of the governor for eight-year terms—two from the state at large and one from each of eight educational districts.

R. Gregg Cherry was inaugurated governor in Jan. 1945. For the most part his recommendations were adopted by the legislature in a 67-day session characterized by relative harmony, caution and conservatism. The legislature made no major changes in the tax structure; no major increases for operating expenses; and no major appropriations for expansion. It left intact the \$20,000,000 postwar reserve fund set up in 1943, with the exception of earmarking \$5,000,000 for veterans' needs; and its first major act was to set aside about \$52,000,000 from the surplus, a sum adequate to retire all of the general-fund bonded indebtedness. Record-breaking annual appropriations of \$116,000,000 were held within estimated revenue. The 3% sales tax was removed from some items, but the tax on wine was sharply increased; the compulsory school attendance age was raised from 14 to 16; and a new state board of education was established and given control

over public school funds. New insurance laws greatly strengthened the power of the department of insurance. The state was made a self-insurer of its property from loss by fire, and a Veterans' commission was created to assist state veterans in securing all available legal rights and benefits.

During 1945 the legislature submitted to popular referendum a proposed constitutional amendment allowing equal rights for women, including jury service.

North Carolina did not contribute to the national Republican landslide of Nov. 1946. The new legislature elected had the usual overwhelmingly Democratic majority; and the state's congressional delegation continued solidly Democratic. The voters approved an amendment to make the constitution equally applicable to men and women as to jury service, suffrage and in other respects. State officers in 1946 were R. Gregg Cherry, governor; L. Y. Ballentine, lieutenant governor; Thad Eure, secretary of state; George Ross Pou, auditor; C. M. Johnson, treasurer; Clyde A. Erwin, superintendent of public instruction; Harry McMullan, attorney general; W. P. Stacy, chief justice. (A. R. N.; X.)

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North Dakota

A west north central state of the United States, North Dakota was admitted to the union Nov. 2, 1889, popularly known as the "Flickertail state." Area, 70,054 sq.mi. of land and 611 sq.mi. of water. Pop. (1940), 641,935, of which 510,012 were rural and 131,923 were urban. On July 1, 1944, the bureau of census est. the pop. at 528,071. Capital, Bismarck (15,496); other cities: Fargo (32,580); Grand Forks (20,228); and Minot (16,577).

Principal officers of the

North Carolina: Statistical Data (continued)

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1939	1940	1941	1943	1944
Total value mineral production	\$11,160	\$18,534	\$20,000	\$19,000	\$22,172	5,976
Stone	3,315	6,979	4,850	4,807	5,377	5,976
Clay	3,408	4,762		5,356	3,000	2,700
Sand and gravel	540	1,001	1,439	2,345	1,824	1,406
Feldspar	539	398	427	552	656	778

state in 1937 were: governor, William A. Langer; lieutenant governor, T. H. H. Thoreson; secretary of state, James D. Gronna; auditor, Berta E. Baker; treasurer, John Gray; attorney general, Alvin C. Strutz.

In 1938 the new state officers were: governor, John Moses; lieutenant governor, Jack A. Patterson; secretary of state, James D. Gronna; attorney general, Alvin C. Strutz; commissioner of insurance, Oscar E. Erickson; com-

North Dakota: Statistical Data

Table I.—Education (Public)

	1938	1940	1942	1943	1944	1945
Elementary school pupils	112,472	105,734	100,655	95,226	90,371	88,378
High school pupils	34,039	33,895	32,548	30,128	27,033	27,154
Elementary teachers	6,390	6,143			5,230	5,111
High school teachers	1,726	1,218			1,490	1,497

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1944
Cases on general relief	10,213	5,860	4,613	5,080	2,556	
Cost of general relief	\$178	\$94	\$70	\$92	\$33	
Recipients of old-age pensions		7,851		8,822	9,234	8,987
Cost of pensions		\$136		\$148	\$161	
Dependent children receiving aid		3,846		6,575	6,946	5,031
Blind receiving aid		109		181	219	126
Workers under unemployment compensation		31,787	27,176	25,900		

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1942	1943	1944	1945
Highway mileage	7,388	7,387	7,330	7,073	7,033	7,103
Expenditures on highways	\$7,497	\$4,558	\$5,654	\$3,932	3,048	4,008
Railroad mileage	5,267	5,267	6,211			5,271

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1944	1945
State revenue	\$19,834	\$19,830	\$20,326		\$41,821	\$39,530
State expenditure	\$20,520	\$20,018	\$14,837		\$30,699	\$40,397
Number of banks	191	180	169	160	154	152
Total bank deposits	\$69,500	\$66,600	\$68,900	\$74,200		
Number of national banks	55	50	50	45	42	42
Deposits of national banks	\$47,682	\$46,114	\$50,886	\$53,846	\$140,087	\$175,776

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1943	1944
Acreage, principal crops	14,138	15,950	16,917	16,162	17,534	
Income from crops and livestock	\$102,000	\$110,394	\$130,594	\$306,654		\$500,000
Leading crops (bu.)						
Barley	21,120	28,962	28,064	67,454	63,648	63,156
Corn	17,252	16,995	24,480	29,000	25,335	35,250
Flaxseed	1,548	1,930	3,888	9,184	15,052	6,695
Hay (tons)	1,008	1,126	1,109			
Oats	29,520	34,546	33,432	74,925	70,924	
Potatoes	11,970	14,025	18,920	17,955	22,100	
Rye	6,720	7,000	9,776	16,082	4,014	1,814
Wheat	57,005	79,068	97,054	112,180	121,486	131,660

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1942 (est.)	1944 (est.)	1945
Wage earners	2,854	2,637		4,800	
Wages paid	\$3,192	\$2,771		\$4,204	
Value of products	45,837	43,767		\$43,767	
Leading manufactured products (value):					
Butter	14,512	12,895	\$24,921	\$34,500	
Flour and grain mill products	7,479	5,304			\$22,011
Newspapers	2,313	2,256			
Bakery products	3,212	2,195			
Poultry	1,611	2,195			

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1941	1942	1943	1944
Total value of production	\$2,873	\$2,653	\$2,690				
Leading mineral products (value):							
Coal	2,639	2,380	2,425	2,715	3,100	3,846	3,716
Sand and gravel	128	152	128				

missioner of agriculture and labour, Math Dahl; commissioner of railroads, Ben C. Larkin; supreme court judge (regular term), A. M. Christianson; supreme court judge (unexpired term), Thomas J. Burke; superintendent of public instruction, Arthur E. Thompson.

Principal state officers in 1939 were: U.S. senators, Lynn J. Frazier and Gerald P. Nye; representatives in congress, William Lemke and Usher L. Burdick; governor, John Moses; lieutenant governor, Jack A. Patterson; secretary of state, James D. Gronna; auditor, Berta E. Baker; treasurer, John R. Omland; attorney general, Alvin C. Strutz; commissioner of insurance, Oscar E. Erickson; commissioner of agriculture and labour, Math Dahl; commissioner of railroads, Elmer W. Cart; superintendent of public instruction, Arthur E. Thompson; judges of the supreme court, W. L. Nuessle, chief justice; A. M. Christianson, A. G. Burr, James Morris, Thomas J. Burke.

In the presidential election of 1940 Wendell L. Willkie received 154,590 votes; Franklin D. Roosevelt, 124,036. In 1940 Gov. Moses was re-elected for a second term. Other state officers included: Oscar W. Hagen, lieutenant governor; Herman Thorson, secretary of state; Berta E. Baker, auditor; Carl Anderson, treasurer; Alvin C. Strutz, attorney general.

On the boundary line between North Dakota and Canada, in the region known as Turtle mountains, a park of 3,000 ac. called the International Peace garden was established in 1941 to commemorate the long-continued peace between Canada and the U.S.

Principal officers of the state in 1943 were as follows: governor, John Moses; lieutenant governor, Henry Holt; secretary of state, Thomas Hall; auditor, Berta E. Baker; treasurer, Carl Anderson; attorney general, Alvin C. Strutz; commissioner of insurance, Oscar E. Erickson; commissioner of agriculture and labour, Math Dahl.

The presidential vote in the 1944 election was 118,535 for Thomas E. Dewey; 100,144 for Franklin D. Roosevelt; 943 for Thomas and 549 for Watson. Sen. John Moses (Dem.) replaced Gerald P. Nye (Rep.). Chief state officers, all elected in 1944: governor, Fred G. Aandahl; lieutenant governor, C. P. Dahl; secretary of state, Thomas Hall; auditor, Berta E. Baker; treasurer, Otto Krueger, attorney general, Nels G. Johnson; superintendent of public instruction, Arthur E. Thompson; commissioner of insurance, Oscar E. Erickson; commissioner of agriculture and labour, Math Dahl; public service commissioner, C. W. McDonnell; tax commissioner, John Gray.

Sen. John Moses (Dem.), who replaced Gerald P. Nye (Rep.), died on March 3, 1945, and Gov. Aandahl appointed Milton R. Young to fill the unexpired term. (O. G. L.; A. V. O.; X.)

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Northern Ireland

See IRELAND, NORTHERN.

Northern Rhodesia

See RHODESIA, NORTHERN.

Northern Territory of Australia

The Northern Territory of Australia was transferred to the commonwealth government from the state of South Australia on Jan. 1, 1911. It extends from lat. 26° S. northward to the Arafura sea and is bounded by 129° and 138° E. Area: 523,620 sq.mi. Pop.: (est. 1946) Europeans 5,200, aborigines (est. 1945) 14,753. Capital: Darwin (pop. 1939 est., 6,200). The territory is controlled by the minister for the interior, the local administration being under an administrator appointed by the governor-general in council.

Immediately after the outbreak of World War II, the commonwealth government recognized the possibility of the extension of hostilities to the Pacific and realized that, in such an event, the northern portion of Australia would be extremely vulnerable and shipping to the northern ports would probably be terminated. A steady program of works, such as the construction of aerodromes, camps, fortifications, and strategic roads, was therefore put in hand and gradually accelerated as the indications of war close to home became more ominous.

Bitumen-surfaced roads were constructed from Alice Springs to Darwin, a distance of 959 mi. and from Tennant Creek to Mt. Isa in Queensland, a distance of 403 mi. When transport by sea was interfered with by the Japanese, these two roads carried practically the whole of the transport of troops, stores and supplies to the northern parts of the territory. When it became apparent that Darwin would be the scene of hostilities, the government evacuated all the women and children and nonessential civilians to the southern states and transferred the principal government departments to Alice Springs. There was a gradual transfer of control from the civil administration to the military authorities, and full military control came into operation on Feb. 21, 1942, after the first raid on Darwin. The Japanese raided Darwin and the northern part of the territory on 65 occasions. A considerable amount of damage was done to Darwin and a number of lives were lost.

The pastoral industry of the Northern Territory contributed in no small measure to the war effort. The works of military importance carried out during the war promised to be of considerable importance in the postwar

Northern Territory: Statistical Data

Item	1938		1941		1945	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Exchange rate . . .						
Great Britain . . .		£A 1.25 = £1		£A 1.25 = £1		£A 1.25 = £1
United States . . .		£A 1 = \$3.895		£A 1 = \$3.198		£A 1 = \$3.198
Finance						
Revenue . . .	£1,055 (\$4,681)*†		£583 (\$2,351)*		£1,717 (\$6,920)*	
Expenditure . . .	£1,055 (\$4,681)*†		£1,288 (\$5,194)*		£1,647 (\$6,639)*	
Transportation						
Railroads		508 mi.				
Communications						
Radio sets		216†		397†		219†
Minerals						
Gold		12,378 oz.		18,869 oz.		3,912 oz. §
Wolfram		477 tons		344 tons		206 tons §
Livestock						
Cattle		899,472		892,881		984,370 ||
Horses		33,191		26,209		31,803 ||
Sheep		29,901		28,245		29,269 ||
Swine		355		418		146 ||
Education						
State schools . .		9		7†		3 ||
Enrolment . . .		680		580†		198 ||
Teachers		19		21†		6 ||
Private schools .		2		2†		1 ||
Enrolment . . .		165		233†		60 ||
Teachers		9		3†		4 ||

*Financial year. †1939. ‡Year ending June 30. §1943. ||1944. ¶1942. §Figures incomplete.

development of the territory. A major work to be carried out was the reconstruction of Darwin. (H. V. J.)

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North Pole

See EXPLORATION, POLAR.

Northwest Territories

The Northwest Territories comprise the mainland portion of Canada lying north of the 60th parallel of latitude between Yukon territory on the west and Hudson bay on the east, together with the islands lying between the mainland of Canada and the North Pole and those in Hudson bay, James bay and Hudson strait. The area of the territories is 1,309,682 sq.mi. The population, according to the 1941 census, was 12,028, including 2,284 whites, 4,334 Indians, 5,404 Eskimos and 6 others. By June 30, 1946, the total had been increased by approximately 3,000 whites, most of whom were engaged in the mining industry.

Government is administered from Ottawa by a commissioner, a deputy commissioner and five councillors appointed by the governor in council. The council in 1946 consisted as follows: commissioner, Charles Camsell; deputy commissioner, R. A. Gibson; members of council, A. L. Cumming, K. R. Daly, R. A. Hoey and S. T. Wood.

The years 1937–46 constituted a period of great development in the Northwest Territories. The mining industry, embracing the production of petroleum, radium and uranium concentrates, gold and silver was vastly expanded, and the Yellowknife field established as a gold producing area of great potentiality. Facilities for transportation, particularly those by air, were expanded and improved, the fur trade was stabilized, steps were taken to provide wider protection for forests and wildlife and the government administrative staffs strengthened. Complementing the economic development was a broad program of scientific research, including geological, topographical, geodetic, hydrographic, biological, agricultural and wildlife surveys. Aerial mapping of a large part of the Mackenzie district

was accomplished, and other areas were being mapped as appropriations were provided.

Mining Boom.—The period 1937–46 was featured by the development of the gold mining industry in Mackenzie district. Discoveries of gold-bearing ore made in the Yellowknife river area on the north side of Great Slave lake in 1934 were followed by a major rush, during which several thousand claims north and west of Yellowknife bay were staked. Development of several of the most promising properties followed and in Sept. 1938, the first gold brick produced in the Northwest Territories was poured at the Con mine of the Consolidated Mining and Smelting Company of Canada. Additional properties which came into production included the Rycon mine of Consolidated, and that of Negus Mines, Ltd.—both adjoining the Con mine—in 1939; Slave Lake Gold Mines, Ltd. (now Philmore Gold Mines, Ltd.) on Outpost Island, and Thompson-Lundmark Gold Mines, Ltd., at Thompson lake in 1941; and Ptarmigan Mines, Ltd., near Prosperous lake, early in 1942. The Ruth mine of Consolidated, in the Francois lake area, was also brought to production stage in 1942, but owing to labour shortages the milling of gold was not commenced.

Mineral production in the Yellowknife district reached a peak in 1942 when gold valued at \$3,826,669 was mined. Of this amount nearly half came from the Con and Rycon mines. Silver production for the same year was \$9,500. Late in 1942 an increasing shortage of labour, brought about by war conditions, forced the Ptarmigan mine to suspend operations. By the end of 1943 all mines, with the exception of Negus, had either closed down or suspended gold production, and the mill of the latter was closed in Sept. 1944.

While gold production in the Yellowknife area declined in 1944, new developments that year foreshadowed increased activity. Diamond drilling carried out during the winter of 1943–44 on properties of Giant Yellowknife Gold Mines, Ltd. disclosed extensive zones of gold-bearing ore, and these discoveries precipitated another rush to the Yellowknife region.

During 1945 and 1946 exploration and staking extended in a broad arc for a distance of nearly 150 miles north-

Herd of reindeer in the government corrals on Richards Island, Northwest Territories

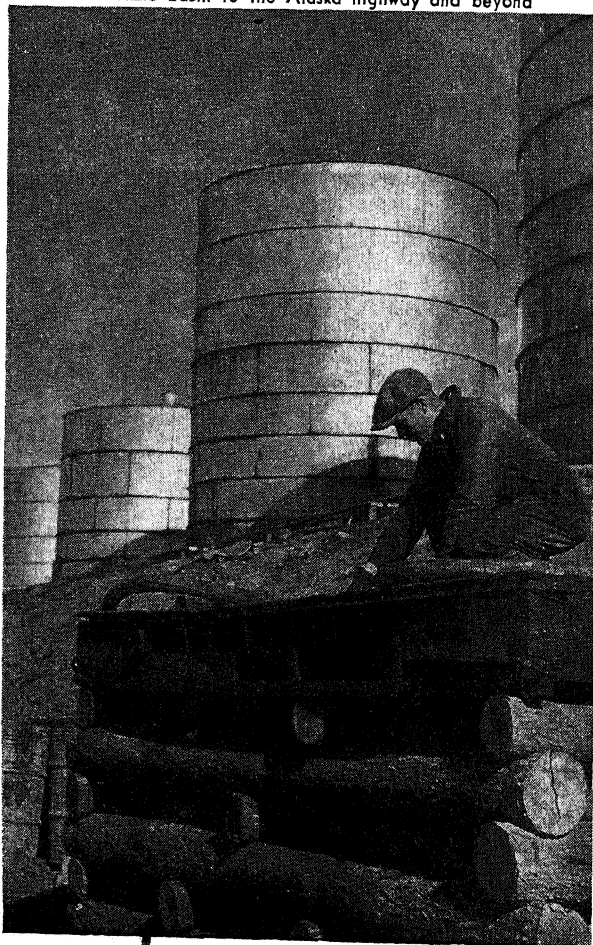


east and east of Yellowknife bay. Development work, including diamond drilling and shaft sinking, was undertaken on many properties. Among the more promising properties being developed were those of Giant Yellowknife Gold Mines, Ltd. and Crestaurum Mines, Ltd. Gold production was resumed at the property of Negus Mines, Ltd. in July, 1945, and at the Con mine in Aug. 1946. The total value of gold production in the Yellowknife district to the end of Oct. 1946, was \$14,938,000. In addition to gold, numerous other minerals were discovered in the Yellowknife area, including silver, lead, zinc, nickel, copper, tungsten and tantalum.

A sequel to the mining activity of the region was the development of the townsite of Yellowknife, on the west side of Yellowknife bay. To meet the needs of a greatly increased population additional areas were surveyed in 1945 and 1946. Numerous buildings, including a modern hotel, private residences, stores and government buildings, were in the course of erection in 1946.

The discovery of pitchblende, the ore of radium and uranium, on Echo bay, Great Bear lake, in 1930, had inspired a world-wide interest in the mineral possibilities of the Northwest Territories. The original find on Labine point was developed by Eldorado Mining and Refining, Ltd., and by 1937 the production of radium in Canada had become a well-established industry. War conditions, however, resulted in disorganized markets, and

Oil refinery at Fort Norman on the Mackenzie river, Northwest Territories, Canada. The Canol pipe line project was undertaken by the U.S. army to carry the huge petroleum reserves of the Mackenzie basin to the Alaska highway and beyond



with a large supply of concentrates on hand at the refinery at Port Hope, Ontario, operations were temporarily suspended at the mine in June 1940. Increased demand for pitchblende products resulted in the reopening of the mine in 1942, and subsequent developments resulted in the operation of the mill at capacity.

As one of the principal world sources of uranium and radium the pitchblende deposits at Great Bear lake assumed a new importance with the announcement of the development of the atomic bomb. The revelation of the part which uranium was to play in atomic research resulted in the placing under government control in 1944 of the mine, mill and other assets of the company, which thereafter were operated as a crown enterprise.

Canol Project.—An important achievement in the Northwest Territories during World War II was the expansion of the Norman oil field in the lower Mackenzie basin. The market for oil products was increased by the opening of gold mines at Yellowknife, and by 1940 a small refinery had been brought into operation.

Soon after outbreak of war with Japan an increased fuel supply for the use of the U.S. army in northwestern Canada and Alaska became imperative, and the Canol project was undertaken early in 1942. An agreement entered into by the governments of Canada and the United States involved a drilling program to determine the extent and capacity of the oil-producing area in the vicinity of Norman Wells, construction of a pipe line from Norman Wells to White Horse, Yukon territory, and the erection of a refinery at White Horse.

Imperial Oil, Ltd., which had pioneered the production of oil in the district, was appointed agent for the United States government and was awarded a contract for drilling and geological exploration. Drilling was commenced in 1942 and continued through 1943 and 1944 into 1945. In March 1944 the production of the field exceeded 3,000 barrels a day. Oil was delivered by pipe line to White Horse and the refinery there was opened in April 1944. On orders of the United States government drilling operations were terminated as of March 8, 1945. The pipe line and the refinery at White Horse ceased operations about April 1, 1945, and the contract with Imperial Oil, Ltd. was officially terminated on May 3, 1945.

During the period 1942-45 when the Canol project operated, a total of 67 wells was drilled, of which 60 found oil in commercial quantity. These wells outlined a field of more than 4,000 acres in extent, with an estimated recoverable reserve of 36,250,000 bbl. of crude oil. Prior to 1942 the production of the field totalled 118,895 bbl. During the life of the Canol project production was 1,858,447 bbl. The total production of the field to Aug. 1946 was 2,175,000 bbl.

The Canol project was a military enterprise undertaken for North Pacific defense, and when its objectives had been achieved economic considerations forced its abandonment. The closing down of the pipe line shut off the main market for the crude petroleum output of the Norman Wells field and most of the wells were later capped or plugged.

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Eldorado Mining and Refining company at Port Radium, Northwest Territories. The pitchblende-silver properties located there formed one of the principal world sources of uranium, an element vital in atomic research

in the Canadian Northwest (1945); Fur Production in the Northwest Territories (1945); Exploration and Settlement of Mackenzie District, Northwest Territories (1946); Weather and Climate of the Northwest Territories (1946); Canada's New North (1946). (R. A. G.)

Norway

Norway is a country (hereditary monarchy) in northern Europe, bounded on the north by the Arctic ocean, on the east by the U.S.S.R., Finland and Sweden, on the south by the North sea. Area: 119,085 sq.mi. Population (est.) 1937, 2,906,100; (est.) 1940, 2,953,000; (est.) 1946, 3,121,000. Capital, Oslo (pop. 1943 est., 275,000). Other principal cities: Bergen (1943, 103,855), Trondheim (1930, 54,458) and Stavanger (1930, 46,780). Language: Norwegian, of Teutonic root, closely related to Danish and Swedish, akin to Anglo-Saxon, Dutch and German. Religion: Lutheran Christian. Ruler during the decade 1937-46 was King Haakon VII (after 1905); crown prince, Olav (b. 1903). Prime ministers of Norway during the decade 1937-46 were as follows: Johan Nygaardsvold (March 20, 1935-June 25, 1945), Einar Gerhardsen (after June 25, 1945).

Uneasy Peace.—The general elections (proportional representation) by the end of 1936 showed the stability of the political situation. Labour returned 70 (+1), the Conservatives 36 (+6), Left 23 (-1), Farmers' party 18 (-5), Commonwealth party 1 (as before), the Christian Popular party 2 (+1); two radical groups lost the one seat each of them had. The Communist vote was negligible and no candidate was elected. The Norwegian National Socialist party (N.S.) obtained less than 2% of the votes; no candidate was elected and the leader, retired Major Vidkun Quisling who was a candidate in Oslo, obtained about one-fourth of the votes necessary. The Labour cabinet (Nygaardsvold) remained in power until the German invasion on April 9, 1940. An heir to the crown was born to the crown prince and princess in 1937 and christened Harald after the first king of Norway.

Under an amendment to the constitution adopted by the storting in 1938, by a (nonpolitical) vote of 123 to 24, the term of legislative office was prolonged to four years,

meaning that the general elections which would regularly have been held in 1939 were postponed until 1940. Previously, the term of office had been three years.

Conditions in the country before the German invasion were most satisfactory; there was growing wealth, general progress and little unemployment. Under the impression of the Munich arrangement of 1938 the nation became more alive to the necessity of keeping up national defense, and the first efforts were made to build up again an army, navy and air force which had been neglected for years in the belief that the neutrality of Norway was inviolate.

At the outbreak of World War II in Sept. 1939 a declaration of strict neutrality was issued, and although the Finnish-Soviet war (1939-40) made a deep impression, there was no tendency to abandon the traditional neutrality. An Anglo-French demand for transit of troops to aid Finland was rejected, and in the League of Nations assembly which expelled the U.S.S.R. (Dec. 1939) Norway abstained from voting. German sinking of Norwegian ships and aerial and maritime warfare along the coast of Norway made neutrality more and more complicated. The U.S. ship "City of Flint," in charge of a German prize crew, anchored at Haugesund without permission on Nov. 3, 1939. It was released by the Norwegian authorities and the German crew was interned. In March 1940 the German government steamer "Altmark," sneaking along the coast of Norway with a number of British prisoners on board was attacked by British destroyers in Norwegian waters at Joessing fjord.¹ The Norwegian government protested in strong terms. Great Britain maintained that German submarines operated from Norwegian territory and had sunk British ships in Norwegian waters; there was a growing irritation because Swedish ore continued to be exported to Germany by way of Narvik and on April 8 Great Britain declared that it had mined Norwegian territorial waters at several points. The strong Norwegian protest was forgotten in the surprise of the German invasion the following day, when every important port was attacked. (See WORLD WAR II.)

The Quisling-Nazi Tyranny.—King Haakon, the storting and the government evacuated to Hamar in the morning of April 9; the Germans failed to capture any of the organs of national sovereignty. At Hamar, and when that city had to be evacuated, at a night meeting at Elverum with only eight members absent, the storting unanimously gave the government every authority that was needed and, also unanimously, agreed to residence of the king and government outside Norway during the war if need be, in conformity with article 11 of the constitution. The small Allied forces which had landed in Norway left in the first days of June; King Haakon and the government evacuated from northern Norway June 7, and for five years thereafter London, England, was the seat of the Norwegian government.

Quisling had proclaimed himself prime minister of Norway on April 9, but being unable to form any government he was withdrawn by the Germans; to prevent chaotic conditions the supreme court of Norway appointed an "administration commission" for the occupied parts of the country. This commission was approved by the king. The German Reichskommissar Josef Terboven worked incessantly to bring about some interim government with a pretense to legality. After the king had left Norway, Terboven tried to force the leaders of parliament to de-

¹The name Joessing was later perpetuated as meaning an enemy of the nazis; a loyal, uncompromising Norwegian.



German infantrymen, dismounted from their bicycles, replying to an ambush on a Norwegian road in April 1940

clare that Haakon had forfeited his right to the crown. He threatened to send the entire youth of Norway to concentration camps in Germany if leaders did not comply, and he promised to refrain from all governmental interference if his request were granted. The *storting* could not meet constitutionally, but members were invited to come to Oslo; the political groups met and discussed an extension of the administration council. The presidential committee of the *storting* was forced to address a letter to the king asking him to abdicate, leaving open to the peace to come the question of succession.

King Haakon refused and stressed his duty to remain loyal to his people and the government. The political leaders finally declined to come to terms with Terboven, and on Sept. 25, 1940, he dissolved all parties except the National Socialist, set up a "state council" with a number of Quisling puppets, declared that King Haakon was dethroned and Norway "indefinitely occupied by German troops." A reign of lawlessness started. The entire supreme court of justice resigned in Dec. 1940 in order not to lend any show of legality to German acts of arbitrary terror, and Paal Berg, the chief justice after the liberation, was publicly acclaimed as leader of the home front.

The history of 1940-45 was a story of ever more obstinate resistance against ever increasing tyranny, growing terror and torture, more and more power being given to the *gestapo*, ever greater numbers being sent to concentration camps in Norway and in Germany, of hostages being shot, of civilians and officers being executed on any pretext, of wanton cruelty and of patient, enduring heroism. The fight to a large extent was a spiritual fight, and in their bid for the youth of Norway the Germans were completely frustrated. The teachers took a firm stand. There were 1,700 arrested, hundreds were sent to do

forced labour, some were shot, schools were closed, but the Germans lost. On Feb. 1, 1942, Quisling was made head of the German-controlled government and started to interfere in church matters. The seven bishops resigned in protest on Feb. 24. The primate, Bishop Eivind Berggrav of Oslo, was imprisoned and remained prisoner until the liberation, but he continued to wield a great influence; 1,100 clergymen resigned, the state church (to which 97% of the population belonged) and the various religious organizations established a joint council, *Kirkens Samraad*, and in July 1942 severed the connection between the state and the church. Quisling dictated that anybody who gave economic support to any resigned clergyman could be imprisoned and have his fortune confiscated. But the church emerged triumphant. Quisling did not succeed in retaining more than about 40 pastors and after the liberation church and state were united as before the invasion.

The Quisling government also tried zealously to gag the universities. Prof. Didrik Arup Seip, rector of the Oslo university, was sent to a German concentration camp in 1942 where he remained till the fall of Germany. Hundreds of students were sent to concentration camps in Germany with professors, poets, journalists. And the resistance gained strength.

The food situation grew more and more desperate. There were very considerable stores of foodstuffs in Norway at the time of the invasion. The national policy, built on the lessons of the blockade in World War I, had been to keep reserves for two years. These reserves were taken to Germany and the country was systematically robbed. When the food situation became desperate in 1943, Terboven made the statement that it was of no

interest to Germany if some 10,000 Norwegians should die from starvation. Had it not been for the aid given by Denmark and Sweden, Terboven's prediction would have materialized. More than 100,000 children were given meals by Swedish organizations, and thousands of food packages poured in from Denmark. The German forces in Norway had been gradually increased to some 375,000 who lived off the country. To this figure must be added large numbers of civilians and about 150,000 prisoners of war. Norway had to pay 150,000,000 kroner a month for the benefit of occupation; any pretext was used for confiscation and the levying of fines. When liberation finally came, Norway's claim to reparations from Germany amounted to 22,963,000,000 kroner or about 8,000 per inhabitant.

In 1942 the entire village of Televaag (near Bergen) was wiped out for the killing of two Germans; every house was burned down in the forced presence of the inmates; the men were shot and the women and children deported. A terrible explosion in Bergen wrecked the 13th-century King's hall, *Haakonshallen*, and the great 16th-century *Rosenkrantztaarn*. In 1942 and 1943 Quisling organized persecution of the few Jews in Norway (not quite 1,400 at the census in 1930, but nearer 2,500 in 1940 on account of refugees having come in). They were all arrested, their property confiscated and 1,500 were sent to Poland. In Oct. 1943 a new decree stipulated the death penalty for any disobedience of orders. It only consolidated the opposition.

Air raids, British-Norwegian commando raids along the coast and the constantly more expert and militant system of sabotage in Norway were annoying the Germans more and more, and to their usual acts of terror was added in the fall of 1944 the complete destruction of the province of Finmark and northern Troms. The commander in chief in Norway, General Nikolaus von Falkenhorst, had been given command over the German army in Finland but had to give way to the victorious Soviets who, in Oct. 1944,

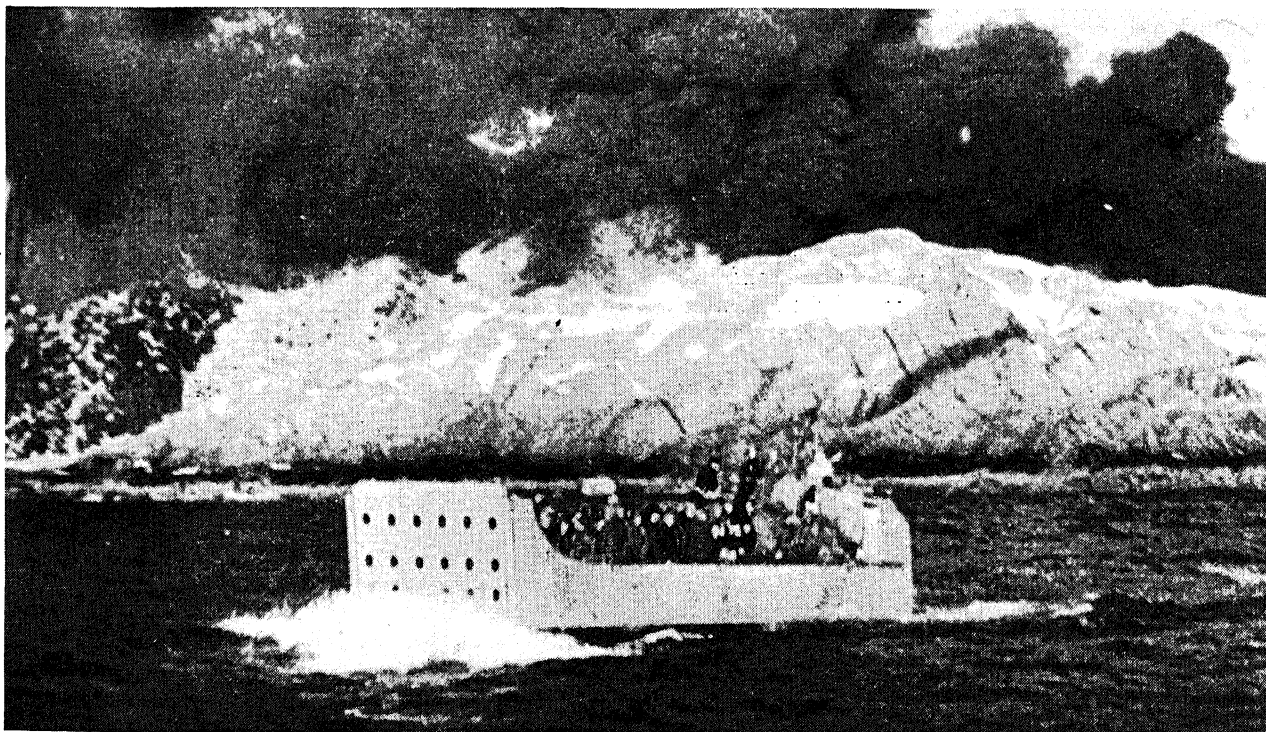
Armoured "invasion barges" raiding Norway's Lofoten Islands on March 4, 1941. The British blew up oil tanks and withdrew with 215 German prisoners and 323 Norwegians

crossed the border to Norway. On Oct. 25 Kirkenes was reported taken, and in November small Norwegian forces from Great Britain landed and fought with the Russians. The Germans declared a scorched earth policy, evacuated the population, destroyed completely every town and village, burned down every farmhouse and stable, blew up lighthouses and churches, killed the cattle and the reindeer and threatened to make Norway a wasteland.

Activity in Exile.—The Norwegian government had been most active after its establishment in London, building up an air force, a navy and the nucleus of an army. Training camps were established in Canada, boys by the hundreds came out of Norway into Sweden across Asia and the Pacific to join up; others crossed the North sea in small boats. The gold reserves of the Bank of Norway had been taken safely out and across the Atlantic. London became the seat of the bank; and thanks to the revenue from the Norwegian merchant marine the Norwegian government was able to carry through without touching the gold reserves and without issuing any loan, and was able to pay the usual interest and to amortize Norwegian external loans. The Norwegian merchant marine, one of the biggest in the world, with its tanker fleet was one of the great assets of the Allies, active on every sea and suffering severe losses. During the war 661 Norwegian ships of 2,351,000 tons were sunk, with a loss of more than 4,000 sailors. But from beginning to end the services rendered were inestimable. At the landings in Normandy, every tenth ship flew the Norwegian flag.

The crown princess with little Harald and her daughters had crossed over to Sweden after the invasion, but by the end of Aug. 1940 she arrived with her family in New York, travelling by way of Petsamo aboard the "American Legion." Until the liberation she made her home near Washington,*D.C.

Dr. Halvdan Koht, who had been foreign minister from 1935, resigned in Nov. 1940 and was succeeded by Trygve Lie, who remained in office until he was elected secretary





general of the United Nations in Feb. 1946. Relations between the government and the home front were most intimate. In 1941 Paul Hartmann, burgomaster of Oslo, went to London to be the representative of the home front in the government. Men from the central administration, experts, lawyers were summoned from Norway as the governmental machinery in London was built up; they came by way of Sweden or across the North sea. Messengers from the government were dropped from planes or sent by way of Sweden. And as terror in Norway increased the number of Norwegians getting across to Sweden constantly grew; the number of refugees reached a maximum of approximately 50,000. These had to be organized, cared for and fed by the Norwegian authorities.

In 1944 an arrangement was made with the Swedish government to give the young men a modern police training in camps under Norwegian military command; when liberation was in sight 10,000-15,000 of these men were sent into Norway to help the voluntary military organization inside the country.

The whole merchant marine was operated as a state concern from the early days of the invasion. Social institutions were built up for the sailors and schools were organized in Great Britain and in Sweden. Laws were also promulgated. Under the Norwegian constitution the king in council could enact laws when parliament was not in session, such laws to be confirmed or rejected by the storting at its first following session.

Capital punishment had not existed in Norway after 1876, except for soldiers under arms in times of war. It was found necessary to introduce it again. The radio and the illegal press—hundreds of small sheets spread all over Norway—brought home the news, despite German con-

Norwegian, wearing a black hood, identifying Gestapo agents from among the Norwegian regular army at Oslo in 1945. With him were Allied intelligence troops prepared to take charge of prisoners

fiscation of radio sets, and despite the threat of execution for listening to London or being found in possession of illegal papers. A number of penal laws for treason, collaboration with the Germans and war profiteering were prepared by lawyers in Norway and sent over to London for final adjustment and adoption; similarly the government sent to the home front drafts of laws and decrees before they were enacted. In this way the necessary legal and administrative mechanism was made ready to put Norway in order when V-day should come. This was particularly needed in all matters relating to finance and to central and municipal administration.

Liberation.—As the fall of Germany became imminent, Mil-Org., the secret military organization in Norway, stepped forward and when liberation came on May 8, 1945, Mil-Org. was able to lend a most efficient assistance to the Allied forces which came to Norway. The German major generals Frantz Boehme and Hermann Hölter signed terms of surrender with Brig. Gen. R. Hilton of the Allied Control commission. There had been widespread fear of a Nazi last stand in Norway and Quisling resistance. The fears came to nought. Reichskommissar Terboven committed suicide; so did his chief of police Lt. Gen. W. Rediess, Quisling's police minister Jonas Lie and his right-hand man Henrik Rogstad. The others surrendered. It was found that 350,000 German soldiers were still in Norway; also more than 100,000 prisoners of war—74,000 Soviet slave labourers, Poles, Yugoslavs, Czechs. The 40,000 young boys of Mil-Org. had a tremendous task in supervising the Germans and liberating the others. Four thousand seven hundred U.S. soldiers came to assist, many of them of Nor-

wegian ancestry, and 13,000 British soldiers.

The Germans were disarmed and brought into camps and by July 1945 were being transported out at the rate of 25,000 per week. The Soviets and other slave labourers were repatriated. Fifteen thousand Soviet troops had come to Norway's aid in the north; the last left Finnmark on Sept. 25 with scenes of mutual gratitude. By the middle of October the U.S. soldiers had departed, and by the end of the year the British had left.

Crown Prince Olav was appointed commander in chief of Norway's military forces. He arrived in Oslo on May 13 with three members of the Nygaardsvold cabinet. On May 31 C. J. Hambro, president of the storting, Premier Nygaardsvold and the other ministers arrived. It was a month of jubilation never to be forgotten in Norway. Church bells chimed throughout the land; 1,200 patriot prisoners were released from the notorious Grini camp and many more from various other concentration camps spread over the country. The crowning glory was the return of King Haakon on June 7, exactly five years from the day when he had left Norway. With him were the crown princess, Prince Harald and his sisters, who had been flown over to England after the liberation. King Haakon sailed in on the "Heimdal," the old navy yacht which had brought him to Norway in 1905. Hundreds of thousands greeted him in the fjord and on the quays and along the streets of Oslo—the most overwhelming manifestation of the tremendous personal popularity of the king who had been a national symbol of strength and unity all through the war. Pres. Hambro summoned the storting, all constitutional legalities were intact, the nation could go to work and normal political life be re-established more quickly and smoothly than in any other country that had been under occupation.

Reconstruction.—Premier Nygaardsvold had broadcast from England long before the liberation that his government would resign as soon as it was back in Norway and hand the reins of government over to those who had stayed at home during the war. The storting met on June 10. Two days later the government handed in its resignation. The king asked Chief Justice Paal Berg to form a cabinet, but he declared that he was too old (73) and referred the king to Einar Gerhardsen, mayor of Oslo, one of the leaders of the Labour party just returned from Sachsenhausen concentration camp in Germany. Gerhardsen formed what might be called a home front cabinet with members of all parties from Conservatives to Communists but with no parliamentarians.

There was a growing tension between the storting and the home front leaders, who felt that a storting elected in 1936 gave no adequate expression to the political sentiments in 1945. Under public pressure the members of the presidential committee who had signed the letter to the king in 1940 resigned; it was obvious that the storting was not popular, but it was essential to good order in the country. On June 29, 1945, the odelsting by a vote of 104 to 4 approved the royal decree introducing capital punishment and on July 2, by a vote of 36 to 2, the lagting approved the law as adopted by the odelsting. Other important laws were enacted concerning penalties for collaboration, parliamentary and municipal elections, banking and financial problems.

Unanimously the storting ratified the United Nations charter and made Norway a member of the U.N. Other important conventions and treaties were ratified. The government could not lay a regular budget before parliament, but necessary appropriations were voted and the first important steps were taken toward financial recovery

and stabilization of currency; 5 kroner to the U.S. dollar and 20 kr. to 1 pound sterling were fixed as the rate of exchange. On Sept. 9 all the old banknotes were called in, all holdings registered and new banknotes issued. War profiteering and tax evasion were hard hit, but the question of a special tax on all increase in fortune during the war years was left to the new storting.

Meanwhile, war criminals and traitors were brought to justice. About 17,000 collaborators had been jailed, prosecuted and sentenced in the most orderly and correct way. On Sept. 10, 1945, Quisling himself was found guilty of treason, murder and theft, after a very full documentation, and was sentenced to death. He appealed, but the supreme court upheld the verdict on Oct. 13; Mrs. Quisling's special appeal was denied by the cabinet on Oct. 22. The puppet leader whose family name had become internationally synonymous with despicable treason was shot at 2:40 A.M. on Oct. 24. Some of his cabinet ministers met the same fate, as did members of his police force found guilty of torture and murder. But the number of executions did not reach 50. Ill-begotten fortunes were confiscated, leading Quislings were sentenced to forced labour and all who joined the National Socialist party after the invasion or remained members, were punished. Gen. von Falkenhorst was sentenced to death at Nuernberg for shooting British and Norwegian prisoners; on appeal the sentence was commuted to imprisonment for life.

General elections were held on Oct. 8, 1945. During the years of war the political party organizations (all forbidden by the Germans) had declared a truce and efforts were made to continue this policy of national collaboration and restraint. A national program of reconstruction was elaborated by a joint committee of all political parties from Communist to Conservative and it was agreed that the election campaign should last only one week. One result was that public interest in the elections was less keen than before the war. On Oct. 8 for the first time in many years no kind of working agreement or alliance was established between any two parties. An attempted amalgamation of the Labour party and the Communists came to nought in a storm of bitter dissensions and recriminations. There were more parties and more candidates running than ever before, but on Oct. 8 only 73% of the electors went to the polls (in 1936 the percentage was 84.2). The Conservatives lost 16% of their prewar vote, the Farmers' party 30%, the Left 14% and Labour 1.5%. The Communists gained 163,300 votes and the Christian Peoples' party 98,200 votes. The result was a new parliament of 25 Conservatives (36), Farmers' party 10 (18), Left 20 (23), Christian Peoples' party 8 (2), Labour 76 (70) and Communists 11 (0).

There was a strong reaction against members of the old storting who had been willing to discuss terms with Terboven in 1940. There was also a public demand for new men who were not too intimately tied up with the old political parties. Only 40 members were re-elected, and 110 new men and women. (In 1936, 104 members were re-elected, in 1933 and 1930, 96.) Eight women were elected, a larger number than ever before.

On Nov. 5 Gerhardsen reconstituted the government. The ministers not belonging to the Labour party, the two communists, disappeared. The composition of the cabinet was as follows: Einar Gerhardsen, prime minister; Trygve Lie, foreign affairs; Kaare Fostervoll, church and public instruction; Oscar Torp, supply; Lars Evensen, commerce; Sven Oftedal, social affairs (these carrying over from the



Crown Prince Olav of Norway returned to Oslo in May 1945 aboard the British destroyer shown in the background. Still clad in British uniform, he is shown standing at attention during the playing of the Norwegian national anthem

earlier cabinet); Jens C. Hauge, defense; Erik Brofoss, finance; Oscar C. Gundersen, justice; Kristian Fjeld, agriculture; Nils Langhelle, public works; and the following consultative ministers, all new: Aslaug Aasland, social affairs; Reidar Carlsen, fisheries; Peder Holt, reconstruction. This was the youngest cabinet in Norwegian history, with five of the ministers under 38 and the average age 44. The members of the storting were somewhat older, on the average 50% as against an average of 52½ after the election in 1936. When Lie was elected secretary general of the U.N., Halvard M. Lange, also from Saxenhausen prison camp, was appointed foreign minister. No member of the government except Torp had ever been a member of the storting or taken any active part in national political life. After the election the new cabinet demanded that the newly elected storting should meet immediately instead of on Jan. 11, 1946, as under the letter of the constitution.

The government could not dissolve the storting; the storting itself had to declare its work to be terminated. In order not to provoke a constitutional conflict, the storting (Nov. 4) unanimously decided to make use of Art. 83 of the constitution and demand an advisory opinion from the supreme court of justice. The court declared it within the power of the storting to authorize a convocation of the new storting before Jan. 1946; on Nov. 24 the storting unanimously declared that its work had come to an end and authorized the meeting of the newly elected storting. This took place on Dec. 4. Nearly every member of this storting had been active in the resistance or in actual warfare. Of 150 members 54 had been in German prisons, and 20 others had been in exile during the war. In the same way most of the members of the government had been prisoners in Germany or in Norway.

The two Gerhardsen cabinets each included a woman; the first woman to be appointed a cabinet minister was Kirsten Hansteen (Communist, widow of the legal adviser to the council of trade unions in Norway, one of the first victims killed by the Germans); the second was Aslaug Aasland. For the first time the new storting elected a woman chairman of one of the permanent committees (of public health), Claudia Olsen (Conservative, president of the National Council of Women in Norway).

The government and the new storting were faced with a tremendous task of rehabilitation, building up again the public administration which had disintegrated during the occupation and recreating a sound financial order in the country. The budgetary year 1945-46 showed a deficit of about 1,003,000,000 kroner. And the proposed budget for 1946-47 had a deficit of 776,500,000. The policy of the government was stabilization—a stable level of prices, including the price of labour. Great efforts at equalization were made; there was a strict control of prices. The farmers received a compensation to keep a low price for milk, meat, etc.

The ships of the merchant marine were handed over to the individual owners shortly after the liberation, and in July 1946 the storting approved an arrangement reached between the government and the ship owners whereby the latter were refunded 1,600,000,000 kroner for the use of the ships and for ships lost during the war years. To speed up reconstruction of houses all over the country, and particularly in the devastated areas, new laws were prepared giving owners full compensation on a 1939 valuation plus 50% in all, about 1,500,000,000 kroner. To finance this operation a special tax was to be laid for ten years on all real estate in the country.

On June 5, 1946, an amendment to the constitution was adopted unanimously by the storting. (The constitutional rules for adopting amendments remained very strict; this amendment had been proposed by the government in 1938, but such proposals could only be discussed after new general elections.) From 1814 to 1920, 25 years was the age of suffrage; in 1920 the age limit was lowered to 23; in 1946 it was lowered to 21 as part of the joint program before the elections in honour of the heroic resistance of the youth of Norway during the occupation.

In July 1946 the storting adopted the necessary laws and rules for levying a special tax on war profits. All increase in fortune after the invasion (exceeding 5,000 kr. for each individual) was liable to tax: 30% of the first 10,000, 50% of the next 20,000, 70% of the next 40,000 and 95% of any higher amount.

The Norwegian government took over German factories and plants bought or built up in Norway during the war, thus giving the state a greater direct interest in indus-

try than it had before. Similarly, the storting in July 1946 approved the organizing of great government-owned iron works (in Mo in northern Norway), the building of which with transmission of electric power would cost about 300,000,000 kroner.

To meet the housing problems which were very acute, particularly in Oslo and Bergen and all devastated areas, a provisional law was passed by the storting giving municipal authorities the right to requisition rooms or buildings to lodge homeless, and limiting the number of rooms at the owner's individual disposal in new houses to be built.

Another problem which caused some anxiety immediately after the liberation was the future of children born of Norwegian mothers and German fathers during the occupation. There were about 8,000, but, mainly through the Norwegian Red Cross, all had been adopted within 18 months after the liberation, some by Swedish but most by Norwegian families, except those whose mothers were allowed to go to Germany to join their husbands.

There was a very strong revival of interest in national defense. The storting appropriated 300,000,000 kroner to buy war materials, including U-boats and corvettes; the ordinary expenditures for the armed forces voted were six times the prewar amount. And the Norwegian government accepted its modest share in the occupation of Germany with about 4,000 men.

A great expansion of the diplomatic and consular services took place. In recognition of Norway's war effort Pres. Franklin Del-

ano Roosevelt on May 17, 1942, raised the U.S. minister to the Norwegian government to ambassadorial rank. The United Kingdom, the U.S.S.R. and later China and France followed the example, and the Norwegian ministers to Washington, London, Moscow, Paris and Chungking were appointed ambassadors.

Norway: Statistical Data

Item	1938		1945	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate				
United States		1 krone = 24.56 cents U.S. 19.9 kroner = £1		1 krone = 20.99 cents U.S.
Great Britain				
Finance				
Government revenues	\$140,551 (\$28,748)		\$459,399* (\$113,854)	
Government expenditures	\$129,370 (\$26,461)		\$459,399* (\$113,854)	
Gold reserves	\$37,586 (\$7,688)		...	
National debt	\$351,048 (\$71,804)		\$1,058,344* (\$262,291)	
Transportation				
Railroads		2,433 mi.		2,714 mi.
Highways		25,249 "		27,328 "
Airways		1,859 "		634 "
Communication				
Telephones		235,264		325,000
Telegraph lines		37,152 mi.		32,930 mi.
Radio sets		364,548		245,400
Minerals				
Iron	1,071,436 tons		136,404 tons*	
Aluminum	32,005 "		5,079 "	
Ferroalloys	149,504 "		21,116 "	
Iron ore	1,625,317 "		117,783 "	
Nickel	9,333 "		1,714 "	
Sulphurous pyrites (containing copper)	1,132,935 "		272,785 "	
Crops				
Hay	3,306,569 tons		2,718,571 tons	
Potatoes	1,033,516 "		1,225,964 "	
Root crops (fodder)	807,765 "		826,021 "	
Straw	672,072 "		600,489 "	
Livestock				
Poultry	3,525,529		966,270†	
Sheep	1,778,395		937,010†	
Cattle	1,398,714		1,227,448	
Forest products				
Timber (round)	3,644,166 cu. ft.†			
Timber (sawn and planed)	40,043 standards†			
Sea products				
Cod (dressed)	240,411 tons		151,731 tons*	
Herring	763,119 "		457,923 "	
Coalfish (dressed)	40,471 "		13,355 "	
Sprat	16,380 "		13,684 "	
Manufactures				
Total	\$496,372 (\$101,528)	...	\$519,773* (\$128,816)	...
Wood and paper	\$102,578 (\$20,981)	...	\$91,052* (\$22,566)	...
Machinery and metal	\$77,791 (\$15,911)	...	\$82,085* (\$20,343)	...
Food	\$64,019 (\$13,094)	...	...	...
Chemical products	\$57,659 (\$11,794)	...	\$56,441* (\$13,988)	...
Exports				
Total	\$193,219 (\$39,521)	5,906,000 tons	\$68,469 (\$16,990)	1,073,128 tons
Paper and manufactures	\$42,076 (\$8,606)	1,147,000 "	\$12,042 (\$2,988)	141,589 "
Fish (fresh, salted, dried, canned)	\$28,206 (\$5,769)	285,000 "	\$17,410 (\$4,320)	103,769 "
Chemical fertilizers	\$13,108 (\$2,681)	490,000 "	\$15,666 (\$3,887)	424,525 "
Aluminum	\$10,926 (\$2,235)	32,000 "	\$1,408 (\$349)	3,132 "
Imports				
Total	\$292,986 (\$59,928)	7,272,000 "	\$253,079 (\$62,799)	...
Ships	\$37,042 (\$7,577)	377,574 gross tons 27,166	\$35,054 (\$8,698)	218,684 gross tons
Machines, apparatus, and component parts	\$25,074 (\$5,129)		\$7,324 (\$1,817)	...
Coal	\$13,340 (\$2,729)	2,502,000 tons	\$15,860 (\$3,935)	1,109,765 tons
Petroleum (refined)	\$9,513 (\$1,946)	601,000 "	\$6,708 (\$1,665)	...
Defense				
Standing army personnel		14,200		Being reorganized
Reserves		120,000		
Standing navy personnel		850		
Standing air force personnel		960		
Military expenditures	\$12,300 (\$2,516)		\$14,736 (\$3,657)	
Education				
Elementary school students		357,793		
Elementary school teachers		10,521		
Middle school and gymnasias students		31,127		
Middle school and gymnasias teachers		1,809		
Continuation school students		16,033		
Universities		11		
Students		4,998		

*1944. †Adult livestock only. ‡1937.

\$1943.

General municipal elections were held in Nov. 1945; they showed the same tendency as the national elections, considerable gains for Communists and Christian Popular party, corresponding losses to the older parties giving as a result a Labour-Communist majority in large sections of the country.

Norway participated in the London assembly of the United Nations in Jan. 1946; in the last assembly of the League of Nations in Geneva, Switzerland, in April 1946, in the Peace conference in Paris, France, July–Sept. 1946, and in the New York city meeting of the general assembly of the United Nations in Oct. 1946. Unanimously the starting ratified Norway's membership in the United Nations Educational, Scientific and Cultural organization. The national policy was to support every effort of co-ordinated international collaboration and at the same time make clear a determination not to belong to any bloc—eastern or western.

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Norwegian literature

See SCANDINAVIAN LITERATURE.

Nose and Throat, Diseases of

See EAR, NOSE AND THROAT, DISEASES OF.

Nova Scotia

Jutting far out into the Atlantic ocean in relation to the rest of Canada, the 21,068 sq.mi. of Nova Scotia, one of the dominion's four original provinces, are almost entirely surrounded by salt water. Inland there are 325 sq.mi. of fresh-water lakes. Only the 15-mi.-wide Chignecto isthmus joins the provincial peninsula to the mainland, and most of the north and all of the east and south coast line is exposed to Atlantic gales. The west side, washed by the bays of Fundy and Chignecto, and the northeast side, washed by the Strait of Northumberland, are more protected.

Steady but unspectacular growth marked Nova Scotia's population from 1931 to 1941, with the cities expanding at a slightly faster rate than the rural areas. But World War II accelerated this trend greatly, and the 55% rural composition of the 1941 census was markedly reduced by 1946. The figures were as follows: (1931) 512,027; (1941) 577,962; (1946 estimate of the dominion bureau of statistics) 621,000. Halifax, the capital, suffered severely from overcrowding during the war years: (1938) 65,889; (1941) 70,488; (1943 estimate) 126,000. Other centres were Sydney (28,305) and Glace Bay (25,147).

Basically, in 1941, the population was about 75% British, 19% French, 3% Dutch, 2% German. Four smaller groups shared the balance. The 1941 census also revealed 5 major religious denominations—Roman Catholic (188,944), United Church of Canada (124,301), Anglican (103,393), Baptist (89,272), Presbyterian (47,415) and several much smaller denominations.

Lieutenant governors for the 1937–46 decade were: Robert Irwin (May 1, 1937–June 10, 1940); Frederick F. Ma-

thers (June 10, 1940–Nov. 30, 1942) and Lt. Col. H. E. Kendall (after Nov. 30, 1942). Premiers were: Angus L. Macdonald (Sept. 5, 1933–July 10, 1940); A. S. MacMillan (July 10, 1940–Sept. 8, 1945) and Angus L. Macdonald (after Sept. 8, 1945).

For more than half of the 1937–46 decade Nova Scotia played a front-line role in Canada's war activities, and during the entire period it was governed by Liberal administrations very largely endorsed by the electorate. In the 1937 election the Liberals won 25 of the 30 seats in the legislature; in the 1941 election 23 seats; in the 1945 election 28. Efforts by the Conservatives to return to power, and the Co-operative Commonwealth Federation to establish itself, came to nothing.

Much Liberal legislation during the period was aimed at promoting industrial expansion, since manufactures accounted annually for the lion's share of the province's production. A department of labour was organized in 1936; in 1937 it authorized collective bargaining rights throughout the province; by 1938 it had full control of conditions and hours and rates of pay for employment and had set up industrial standards.

In 1943 a royal commission on provincial development and rehabilitation was appointed to study problems relating to postwar expansion of industry and markets, and re-employment of ex-servicemen and war workers. In 1944 a committee on rehabilitation of agriculture studied rural electrification, land conservation, flood control. The government worked out a detailed plan for postwar expenditures of \$40,000,000 on highways, public buildings, education, rural electrification and the development of natural resources.

In 1945 a research council was established with an endowment of \$1,000,000 to explore the province's natural resources, determine potential industries, expand existing industries and find more markets. In the same year the department of industry increased its financial service to fishing, agriculture and other major industries, and to smaller home industries such as weaving, pottery, wood carving and the production of Irish moss.

Nova Scotia processed more raw materials from mine and forest, manufactured more goods, grew more food and caught more fish during World War II than in the preceding years. At the start of the 1937–46 decade annual production was about \$150,000,000; by 1943 it had increased to \$333,000,000 with the peak still to come. The number of industrial employees doubled and capital investment increased by 50%. The per capita national income in 1939 was \$277; in 1944 it was \$562. The number of radios and telephones per hundred went up about 40% during the period.

Curtailment of war-generated activity was sharply felt throughout the province toward the end of the decade, notably in port tonnages handled and in shipbuilding and repair. Mining, particularly coal mining, however, suffered during and because of World War II. Shortages of skilled labour, when many miners enlisted, pulled down production. In an effort to restore output and yet not create depressed areas, the mine operators began a higher degree of mechanization in 1945.

Despite labour shortages and shipping problems and even despite a decrease in farm capital investment over the decade, Nova Scotia's farm production soared. With from one-third to one-half of Canada's apple supply coming from the Annapolis valley a further increase in farm income came when a \$250,000 apple cold storage plant was erected in the valley with government help. In 1946 the provincial agriculture college was enlarged to provide fur-

ther training in scientific farming and thus capitalize on war-made gains.

Although fishing was only fifth in dollar value in Nova Scotian economy during the 1937-46 decade, it was nevertheless the livelihood of many communities because of the province's extended shore line. Moreover, wartime demands for food expanded the market, and the catch went up from \$9,000,000 in 1936 to \$23,000,000 in 1944. To hold this gain the government offered scholarships to train fisheries leaders, set up a permanent fisheries survey division and established publicly-owned facilities for processing and marketing the catch. Most notable assistance was financial help for construction of offshore trawler choppers controlled by the fishermen who manned them. The draggers increased the per manday catch. A far-reaching private enterprise development came in 1945 when a large group of financiers organized National Sea Products, Ltd., a co-ordination of about 40% of the privately-owned fish com-

panies of the province. An international fisheries problem arose in 1946 with the invasion of the Quero banks by large-tonnage Portuguese and French trawlers which threatened to deplete the areas.

In common with the other maritime provinces, Nova Scotia turned attention to tourism. In 1945 the government set an example for other provinces by creating a \$250,000 fund from which it made cheap long-term loans to tourist resort operators to increase their facilities. In the same year biological survey parties were sent into the lake and stream-dotted forests to increase the salmon and trout for sport fishing.

(C. Cy.)

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Novikov, Alexander Alexandrovich

Novikov (1905–), Russian air officer, was an infantryman at the beginning of his military career, but transferred in the late '30s to the air force. When Germany invaded the U.S.S.R. in June 1941, Novikov was a major general directing air planning operations. He considered his main task that of saving the Red air force from complete extermination by the numerically superior luftwaffe. He ordered Russian aircraft factories to concentrate on the construction of fighter planes, and manoeuvred the air forces under his command with telling effect and skill. Novikov was promoted to the rank of lieutenant general

Nova Scotia: Statistical Data					
Item or Number	1941		1944		
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	
Canadian = £1		\$4.45 Canadian = £1		\$4.45 Canadian = £1	
Canadian =		\$1 Canadian =		\$1 Canadian =	
cents U.S.		90.9 cents U.S.		90.9 cents U.S.	
	£4,177		£4,011*		
	(\$16,834)		(\$16,184)		
	£3,952		£3,412*		
	(\$15,934)		(\$13,768)		
397 mi.		1,396 mi.		1,396 mi.	
001 mi.		15,063 mi.		15,093 mi.	
832		57,021		67,758	
321		62,496		82,694†	
417 tons		7,387,762 tons		5,745,671 tons	
378 tons		1,440,140 tons†		911,970 tons	
560 oz.		19,170 oz.		5,840 oz.	
856 tons		1,395,172 tons		401,284 tons	
950 tons		54,007 tons		38,809 tons	
000 tons		667,000 tons		788,000 tons†	
000 tons		185,000 tons		140,000 tons†	
000 tons		106,000 tons		107,000 tons†	
000 tons		50,000 tons		70,000 tons†	
000		215,000		226,000†	
000		138,000		160,000†	
000		44,000		59,000†	
000		36,000		35,000†	
	£18,000\$	...	£42,457\$...	
	(\$79,831)		(\$171,313)		
	£3,296\$	...	£5,391\$...	
	(\$14,617)		(\$21,754)		
	£543\$	...	£746\$...	
	(\$2,407)		(\$3,010)		
	£1,414\$	...	£4,028\$...	
	(\$6,272)		(\$16,253)		
	£1,196\$	...	£1,402\$...	
	(\$5,303)		(\$5,659)		
	£532\$	...	£7,650\$...	
	(\$1,560)		(\$30,867)		
576		122,035		120,325	
498		4,005		4,333	
444		438		398	
228		20,448		16,121	

*Provisional figures.

†1945.

†1940.

†1937.

†11th place in 1937.

†1939.

†1943.

in Nov. 1941, and in 1942 he succeeded Lt. Gen. Yakov Smushkevich as chief of the Red air force. He personally conducted soviet air operations during the battle of Stalin-grad, and was made a colonel general in Jan. 1943. In Feb. 1944 Stalin appointed him Russia's first marshal of the air forces, a post especially created for him. Under Novikov's direction Russia's air force was built principally for tactical purposes. He committed his air fleets to close support of ground troops, and strategical long-range bombing attacks occupied only a minor position in his concepts of air strategy.

Novikov, Nikolai V.

Novikov (1903–), Russian diplomat, was born on Feb. 7, 1903, in Leningrad. A graduate of the Oriental institute in Leningrad in 1930, Novikov also studied at the Institute of Professors of the World's Economics and Politics at Moscow from 1935 to 1938. Entering the soviet diplomatic service, he was first attached to the foreign office in Moscow, and was appointed in Oct. 1943 minister to Egypt. In addition, he was named ambassador to the governments in exile of the Balkan countries then centred in Cairo. Novikov served as a delegate to the United Nations San Francisco conference in March 1945, and acted as chargé d'affaires and minister-counsellor in the soviet embassy in Washington. On April 10, 1946, he succeeded Andrei Gromyko as ambassador to the United States. During the Paris peace conference in that year Novikov was a member of the Russian delegation.

378 Nuernberg Trial

See WAR CRIMES.

Nursery Schools

See EDUCATION.

Nursing, War

In 1870 the United States had only 1,200 professional nurses. In following years their number steadily increased until by 1941, 365,000 were on duty or in nursing schools. Major fields of nursing developed during this period, including institutional, industrial, private practice and public health nursing.

With the coming of World War II, the nation was no more prepared to meet the serious drain on nurse power than on other specialized types of manpower. As early as 1939, however, nursing authorities were on the alert as war spread from one foreign country to another. In 1940, representatives of professional nursing organizations, and of government agencies concerned with nursing, met to plan a nursing service as part of the national defense program.

This group organized a Nursing Council on National Defense which later became the National Nursing Council for War Service. A subcommittee on nursing was established as a part of the Health and Medical committee in the Office of the Defense Health and Welfare Services. The function of this subcommittee was to make over-all plans for war nursing needs and to co-ordinate war nursing activities.

For many years the American Red Cross had been the official recruiting agency of nurses for the armed forces. With the formation of the subcommittee, a concerted effort for immediate recruitment was made through the co-operation of all the member organizations of the National Nursing Council for War Service. This led later to the establishment of the Procurement and Assignment Service for Nurses in the War Manpower commission.

As the first step in the recruiting program was a determination of available nursepower, a national inventory of nurses was begun in 1940 by the U.S. public health service at the request of the National Nursing Council for War Service. By 1941, almost 300,000 registered nurses returned questionnaires. In June of that year, congress appropriated more than \$1,000,000 to be administered by the U.S. public health service to assist schools of nursing in the preparation of nurses for national defense.

Refresher courses were offered with the result that many older nurses and many married nurses returned to full or part-time duty. Nursing schools made an effort to enrol more students than ever before. Training courses were telescoped so that graduate nurses would be available sooner. Scholarships and other inducements were offered to augment enrolment.

In order to relieve professional nurses of duties which could be performed by other personnel, the American Red Cross began in 1941 to train volunteer nurses' aides. By April 1944, about 120,000 women had completed the 80-hour course. Later, the civil service commission recruited nurses' aides for paid positions in hospitals.

Lack of Nursepower.—To equalize the withdrawal of nurses for war service from all areas and types of work, and at the same time to secure more efficient utilization of those who remained in civilian areas, the National Nursing Council for War Service requested that a division

of nursing be set up in the War Manpower commission. This division was established in 1943.

In 1942, the National Nursing Council for War Service, having declared military needs to be paramount, urged that the services of private duty nurses be restricted to the care of acutely ill patients. The civilian nurse shortage became more and more serious; demands upon those who were still available became greater and greater. Civilian hospitals lost many of their physicians to war service and had to rely more and more on their depleted nursing staffs. This shortage of both medical and nursing services in civilian hospitals occurred at a time when unprecedented demands were being made for such services. For example, in 1943, 1,000,000 more patients were treated and 500,000 more babies were born than in 1941.

Industry, too, made greater and greater demands on nursepower. The number of nurses in industry increased from 2,200 in 1937 to 12,838 in 1943—almost sixfold in six years. Shipbuilding, aircraft production, manufacture of ordnance material and associated war activities absorbed many nurses.

More nurses than ever before were needed in physical fitness programs for school children, in child-care centres, and as instructors in first-aid and home-nursing courses. Concentration of migratory workers in war industry areas created a need for nurses in temporary camps.

In addition to civilian demands for public health nurses, federal requirements outside the military expanded. Specialists in psychiatric, orthopaedic, pediatric, obstetric and communicable-disease nursing were wanted in ever-increasing numbers. By 1946, more than 20,000 public health nurses were employed in various nursing capacities in the United States and territories by local, state and national agencies.

Cadet Corps.—As it became apparent that something had to be done to stimulate the enrolment of student nurses in schools of nursing, the United States cadet nurse corps was established in July 1943 under the provisions of the Bolton Nurse Training act. Administered by the public health service, the corps provided scholarships for qualified young women and grants-in-aid to schools whose curricula and clinical facilities met the standards set up by the service in co-operation with an advisory committee on nurse education.

The Nurse Training act also provided funds to prepare graduate nurses for positions requiring advanced study. As provided by the act, grants-in-aid were given to approved schools of nursing for tuition, fees, maintenance, uniforms and monthly allowances for student nurses; and for maintenance, tuition and fees for postgraduate courses.

The function of the U.S. cadet nurse corps was three-fold: recruitment of additional student nurses, more rapid preparation under an accelerated program and more equitable distribution of nursing services. Hospitals without schools of nursing were given more nursing services through affiliations and through use of the services of senior cadets which, in turn, enabled hospitals with schools of nursing to enrol more students.

Expanded enrolment of student nurses in the U.S. cadet nurse corps also made it possible for hospitals to release more graduate nurses to the armed forces. Senior cadets gave actual service in the military hospitals as they prepared for military service on graduation. Graduate corps members formed a reservoir from which the armed services could commission nurses.

From the inception of the corps in 1943 to Oct. 15, 1945, the final date for new admissions, 177,004 young women participated in the program. More than 1,100 schools of

nursing were approved for basic programs. By Feb. 1946 corps strength was about 115,000. Both as student nurses and as graduate nurses, these young women served in essential civilian hospitals and health agencies. In the three-year period ending June 30, 1946, 19,023 graduate nurses also received aid for advanced study.

Although in May 1944 the army announced that it had reached its goal of 40,000 nurses, it sent out an urgent call in Jan. 1945, for 10,000 more. By July 1944 the navy had 8,400 nurses and needed 3,200 more, asking for recruits at the average rate of 500 a month. So desperate was the need for nurses in all theatres of operations and in military hospitals at home, that a bill to draft graduate nurses 20 to 44 years of age was passed in the house of representatives in March 1945. A spectacular increase in army and navy nurse corps enlistments was precipitated by the conviction of need created by the president's message and by the subsequent congressional hearings on the bill. Because of the magnificent response and the progress of the military campaigns, the bill was withdrawn before action was completed in the senate.

Nurses in War.—During the years of World War II, U.S. nurses showed not only professional ability but also personal bravery and devotion to duty. Awards and decorations received by army nurses totalled 1,606, and many entire units received the Meritorious Service Plaque. There were 67 army nurses interned at the Santo Tomás prison camp in Manila. Approximately 196 army nurses lost their lives during World War II from accidents, disease and enemy action. Up to May 1946, approximately 100 members of the navy nurse corps were given military awards for distinguished service in line of duty in the course of World War II; 16 were imprisoned by the Japanese; 29 lost their lives.

The status of nurses was raised during these years as indicated by the action of several government agencies. Nurses in the armed forces were given commissioned rank by act of congress. The creation of the department of medicine and surgery in the Veterans' administration, on Jan. 3, 1946, by Public Law 293, opened the way for the establishment of greater professional opportunities for nurses, physicians and dentists so that leading professionals in these fields were attracted to the Veterans' administration. By fall of 1946, the number of nurses in that agency had doubled over the number prior to World War II. Throughout the whole federal civil service, nurses received a higher rate of pay and reclassification to professional grade.

Also contributing to improvement in the status of nurses was Public Law 346, 78th congress (the G.I. Bill of Rights). Under the provisions of this law, women veterans, including nurses, were entitled to the same privileges as men. Taking advantage of the educational benefits of the bill, many nurses enrolled at universities for graduate study.

Higher Standards.—In the U.S. public health service, expansion of organized nursing activities was accelerated after Dec. 7, 1941. A permanent commissioned corps of nurse officers, including a reserve corps, became an integral part of the service. For the first time, registered nurses were appointed as commissioned corps officers. Nurses were assigned to hospitals, medical relief stations and dispensaries under the jurisdiction of the service, and to federal prisons and special projects. In nation-wide health programs of the public health service, nurses assisted in tuberculosis, mental hygiene, venereal disease control, sanitation, industrial hygiene activities and in all fields of public health nursing.

The trend was to set higher and higher educational

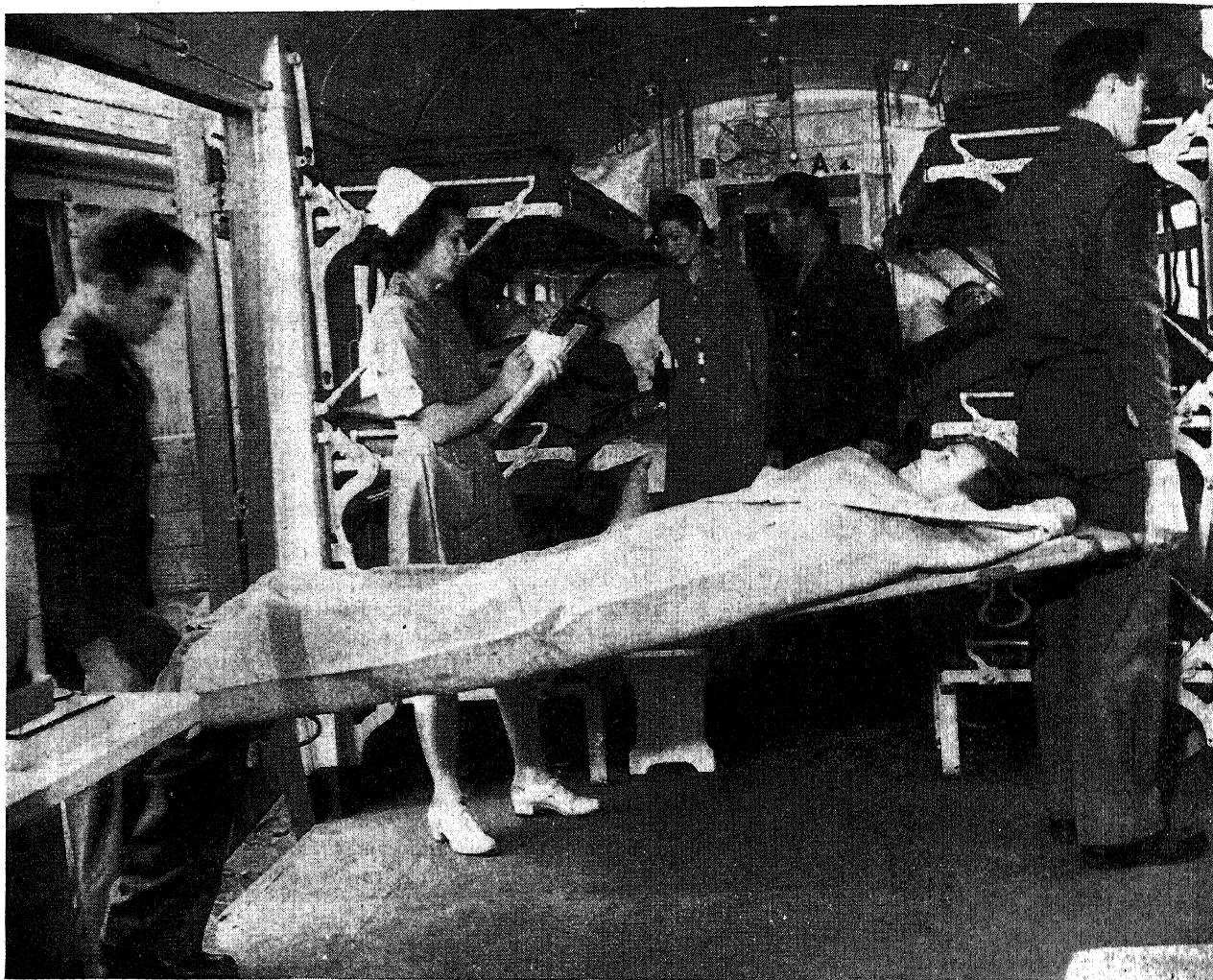
standards for nurses and to demand more and more academic training to enrich their practical experience. Nurses hoping to fill administrative, instructional, consultant and specialized positions such as nurse anaesthetist, research assistant and technician were expected to expand their usefulness by graduate study in colleges and universities providing programs in these specialties.

During the ten eventful years 1937-46, legislation enacted by congress authorizing programs of mental health research and of hospital construction aroused the interest of laymen, the medical profession and government agencies. To carry out the provisions of such federal legislation required an increasing number of nurses in government and nongovernment organizations. Likewise, expanding health programs in the children's bureau, the Office of Indian Affairs, the public health service and the Veterans' administration increased the demands on the nation's nursepower.

In addition to the reservoir of graduate nurses, the nation needed to draw upon a steady stream of student nurses. The number of full-time graduate nurses required for the postwar population was estimated at 359,500. To meet these needs, the National Nursing Planning committee, organized in 1944 under the auspices of the National Nursing Council for War Service, prepared a five-year plan for nursing. This plan included maintenance and development of nursing services in all fields, a program of nursing education, channels and means for distribution of nursing services, implementation of standards, and an information and public relations program.

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Great Britain.—The nature of the war effort and the exposure of Great Britain to air attack in World War II made a strict line of demarcation between war and civilian nursing impossible; although army, navy and air force hospitals were set up, a far greater use than in World War I was made of all types of civilian hospitals, where service wounded were nursed with civilians. British nurses served with the British forces in every theatre of war, often working close up behind the battle. Besides state registered nurses, mobilization involved a large number of V.A.D. (voluntary aid detachment) members, enrolled by the British Red Cross society (B.R.C.S.) or the Order of St. John, who were mobile and who worked with the nurs-



U.S. army nurse checking in a stretcher case on a hospital train in England during 1943

ing services in army, navy and air force hospitals both in Great Britain and abroad.

Under the auspices of the ministry of health, an emergency medical service with a civil nursing reserve of trained nurses, assistant nurses (later enrolled under the Nursing act of 1943) and nursing auxiliaries was in readiness. A large number of the auxiliaries were members of the B.R.C.S. or the St. John Ambulance brigade. These organizations, at the request of the ministry of health, also provided a number of auxiliary hospitals and convalescent homes, largely staffed by their own members.

England and Wales were divided into 11 regions for purposes of the emergency medical service, a principal matron being appointed in charge of the nursing side, with 12 regional nursing officers; comparable arrangements under the control of the department of health were made for Scotland. In 1941 the principal matron was also appointed chief nursing officer to the newly established division of nursing at the ministry of health. A number of E.M.S. hospitals were established by taking over the whole or part of the large mental hospitals, making use of all existing hospitals available, often with the addition of hutments, and by converting suitable buildings. The area around London was divided into ten sectors, each with a medical and an administrative officer in charge and a sector matron, with one of the large teaching hospitals as the key hospital of each. Co-ordination between the voluntary and municipal nursing services was ensured by

the association of liaison sector matrons with sector matrons.

Under the auspices of the port of London authority, a river emergency service was organized, ten pleasure steamers being converted into mobile first-aid posts on the Thames. The dispersal of staffs caused by the large-scale evacuation of London hospitals often involved the concentration of large groups of nurses from several hospitals in a single sector hospital. This led to many problems of administration and to much planning to retain a satisfactory standard of nursing education. Nursing recruitment was pressed forward by both voluntary and statutory bodies; in Scotland it was undertaken by the Scottish board of the Royal College of Nursing until 1945.

Many special demands were made upon nurses during World War II. Their services were claimed in connection with first-aid posts, air-raid shelters, rest centres, refugee camps, wartime nurseries, evacuation of mothers and children to reception areas, children going abroad under government schemes, rehabilitation plans, etc. For the benefit of war workers in munition and other factories, a great increase had to be made in the number of industrial nurses.

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(R. M. Hs.)

Nutmegs

See SPICES.

Nutrition

See DIETETICS; MEDICINE; VITAMINS.

Nuts

The four principal nut crops of the United States, pecans, walnuts, almonds and filberts, became an industry returning nearly \$100,000,000 in 1946 following a decade of steady expansion. Since nut plantations come into bearing slowly, the increase was not the result of sudden war stimulation, although the advancing price did lead to more careful picking and to some wider harvest of wild seedling varieties of pecans.

Pecans, the most widely-grown commercial nut crop, were also first to be grown for market in the United States. Wild pecans, like wild walnuts and hickory nuts, had been harvested from colonial times. In 1937 a high production of 22,900,000 lb. of improved varieties averaged 10.9 cents per pound in price. By 1945 this crop had grown to 56,979,000 lb. and the price was about 27 cents per pound. The crop of wild seedling pecans in 1937 was 53,900,000 lb. and in 1945 75,603,000 lb. Pecan growing of improved varieties was largely centred in Georgia, which produced more than half of the total crop of improved varieties in 1945. The centre of the wild or seedling crop was in Texas and Oklahoma, which produced three-fifths of the total crop in 1945. Louisiana and Alabama were also important producers of the wild varieties. The record crop of pecans was 140,165,000 lb. in 1944—54% above the 10-year average 1933–42. The total crop in 1937 was 76,800,000 lb. Pecan prices for all varieties were at a low point of 7.7 cents per pound in 1937 and rose steadily to a top of 23 cents per pound in 1943. Improved varieties reached a top of 28.5 cents in 1943. Pecans were imported up to 1935, but after that year there was a large balance of exports, amounting to nearly 4,000,000 lb. in 1944.

U.S. Pecan Production by Leading States 1937–46
(In millions of pounds)

	Improved Varieties				Wild Varieties			
	1937	1939	1943	1946	1937	1939	1943	1946
U.S. Total	22.9	21.3	56.7	32.9	53.9	42.3	75.4	44.2
Georgia	7.8	8.0	25.6	13.0	.6	.6	4.8	3.0
Alabama	3.6	3.6	8.3	5.1	.5	.4	2.2	1.6
Texas	1.2	1.1	3.9	3.4	25.7	17.8	22.1	19.1
Mississippi	4.3	3.4	5.3	2.0	3.8	3.5	3.7	2.0
South Carolina	1.0	1.1	3.6	1.2	.1	.2	.4	.2
North Carolina . . . . .	.8	.7	2.3	1.4	.3	.2	.3	.1
Florida	1.1	1.2	2.5	2.6	.3	.2	1.9	1.8
Louisiana	1.5	1.1	2.6	2.2	3.6	2.9	9.3	6.7
Oklahoma . . . . .	.7	.5	1.5	1.4	13.1	12.4	24.4	7.6
Arkansas . . . . .	.6	.4	1.2	.3	4.6	3.0	3.4	1.7
Missouri . . . . .	.00	.00	.05	.02	.7	.4	1.3	.6
Illinois . . . . .	.00	.00	.02	.03	.2	.1	1.2	.1

The Persian or English walnut crop centred in California, with Oregon increasing in importance during the decade 1937–46. Before 1937 the California crop ranged between 25,000 tons and 50,000 tons, except in a few bad years. By 1937 this crop had grown to nearly 60,000 tons. In 1941 it made a record of 63,000 tons. Oregon produced 2,600 tons in 1937 and 7,000 tons in the good year 1941. The total walnut crop was 70,000 tons in 1941 and then declined through 1946. Labour shortage at harvest affected output adversely during the later war years. Imports of Persian walnuts frequently were large, exceeding the amount of the domestic crop until 1935, when a balance of exports began. The price of walnuts ranged from \$181 per ton in 1937 to \$478 per ton in the last year 1943. The leading walnut-producing countries were France, Italy, Turkey and Bulgaria, in that order. The total production outside the United States was about 2,000,000 bags of 110 lb. each in 1937 and only 800,000 bags in 1944.

The almond crop, confined to California, ranged be-

tween 6,000 tons and 23,100 tons from 1937 to 1945. The price advanced in this period from \$275 per ton in 1937 to \$748 per ton in 1944. Almonds were also produced in large quantities in Italy, Spain, Iran and Portugal. Total production of the countries outside the United States was estimated at about 60,000 tons average before World War II, and 52,000 tons in 1944. United States imports increased from about 5,100 tons in 1937 to 37,492 tons in 1944.

More than 90% of the U.S. filbert production came from Oregon and Washington. The crop developed into an important commercial product after 1930. In 1937 Oregon produced 2,230 tons and Washington only 340 tons. By 1943 the Oregon crop had increased to 6,200 tons and the Washington crop to 830 tons, a total crop of 7,030 tons. Prices advanced from \$217 per ton in 1937 to \$540 per ton in 1944.

Tungnut production became important enough to be reported in 1940. It developed in the Gulf coast states, where the number of young trees was increasing rapidly. The census of 1930 reported 351,000 trees in the southern states and in 1940, 12,671,000 trees. The crop of 1940 was 11,000 tons; 1941, 8,750 tons; 1942, 16,350 tons; 1943, 6,200 tons; 1944, 26,680 tons; 1945, 37,080 tons and 1946 47,300 tons. Mississippi led in production, with Louisiana and Florida next in order. The price rose from \$41 per ton to \$100 per ton in 1944. Imports of tungoil amounted to 97,049,000 lb. in 1940 but declined to nothing by 1943. (See also COCONUTS; PEANUTS.) (J. C. Ms.)

BIBLIOGRAPHY.—For statistics of production, trade, U.S. Dept. Agric., *Agricultural Statistics*; B. J. Sitton, *Pecan Grafting* (1940).

NWLB (National War Labor Board)

See WAR AND DEFENSE AGENCIES.

NYA

See NATIONAL YOUTH ADMINISTRATION.

Nyasaland

See BRITISH EAST AFRICA.

Nylon

See CHEMISTRY; INDUSTRIAL RESEARCH; PLASTICS INDUSTRY; RAYON AND OTHER SYNTHETIC FIBRES; TEXTILE INDUSTRY.

Oats

The U.S. oats crop, second in importance to corn as livestock feed, increased steadily in importance until 1915, when the first crop exceeding 1,400,000,000 bu. was harvested. This record was approached again in 1917, 1918, 1920, 1924 and 1925, after which a ten-year decline began. In 1937 the crop began to increase again and expanded to a production of more than 1,547,000,000 bu. in 1945, an all-time record. The yield was high, 37.3 bu. per acre, compared with a 10-year average of 29.6 bu. during 1934–43. Oats production varied widely from year to year, and two large crops seldom came in succeeding years. The poorest year in the 20th century was 1934, when the total crop was only 542,306,000 bu. The crop declined between the two world wars because of the decreased need for oats as a horse and mule feed as numbers of these animals were replaced by the tractor, truck and automobile. But the use of oats as a feed for dairy stock and poultry increased in later years. The yield of oats was high in the 1940–45

U.S. Oats Production by Leading States 1937-46
(In millions of bushels)

	1937	1939	1941	1942	1943	1944	1945	1946
U.S. Total . . .	1,161.0	935.9	1,138.0	1,349.0	1,143.0	1,154.0	1,547.0	1,498.0
Iowa . . .	271.9	155.4	178.2	196.2	184.0	135.1	214.4	227.8
Minnesota . . .	165.3	151.6	116.1	177.5	142.7	155.9	242.6	197.5
Illinois . . .	166.3	92.5	147.5	137.7	113.0	100.8	158.1	169.9
Wisconsin . . .	79.3	71.0	75.0	100.5	100.3	118.9	152.3	120.0
South Dakota . . .	30.7	45.9	53.2	90.4	70.5	92.4	147.9	93.4
Michigan . . .	34.2	42.7	44.2	67.4	23.8	44.1	64.4	74.0
Missouri . . .	43.4	40.9	47.6	59.4	51.7	29.9	31.1	69.0
Nebraska . . .	35.6	20.5	54.0	58.2	71.6	35.5	74.1	68.6
Ohio . . .	35.5	31.1	48.9	51.8	29.4	37.1	53.2	67.0
Indiana . . .	45.1	25.2	55.0	52.3	33.2	31.4	59.6	57.8
North Dakota . . .	29.5	34.5	51.2	74.9	70.9	82.0	82.4	50.9
Kansas . . .	35.3	21.1	35.1	46.2	47.4	28.0	17.6	41.9
Texas . . .	30.4	28.7	36.1	11.2	21.9	38.6	42.4	37.3
New York . . .	18.8	25.8	25.6	33.4	9.7	25.0	20.8	30.7
Pennsylvania . . .	24.7	26.2	31.2	26.0	14.8	23.9	24.5	22.5
Oklahoma . . .	27.3	21.1	24.9	23.9	22.9	27.5	19.8	28.9
South Carolina . . .	10.0	11.5	11.7	13.4	14.1	15.0	16.0	16.7
Georgia . . .	8.6	8.9	9.7	10.1	10.1	13.0	15.0	14.0
Mississippi . . .	1.4	2.7	5.7	9.0	9.0	15.0	13.6	11.5
North Carolina . . .	4.8	5.0	6.5	6.6	5.9	8.1	9.1	11.1
Montana . . .	4.0	9.0	11.1	20.3	18.7	15.7	9.4	10.4
Oregon . . .	10.3	11.7	9.7	10.0	11.3	10.8	7.8	8.6
Arkansas . . .	3.3	2.9	3.0	7.9	6.8	9.4	8.2	8.4
Idaho . . .	4.9	6.2	5.4	7.8	7.8	7.3	6.8	6.3
Washington . . .	8.0	11.2	9.9	10.5	9.2	7.7	7.0	6.9
Colorado . . .	4.4	4.2	5.4	5.6	5.3	5.4	7.2	5.7
California . . .	3.0	3.9	3.3	5.6	5.4	5.3	5.1	5.4
Alabama . . .	2.6	2.8	4.8	4.8	3.9	4.6	5.2	4.5
Tennessee . . .	1.4	1.4	2.3	3.1	3.3	3.6	4.4	4.5
Virginia . . .	1.6	1.6	2.4	3.5	2.8	3.6	3.7	4.3
Wyoming . . .	2.7	2.2	4.5	3.9	3.9	4.3	4.5	4.2
Maine . . .	3.9	4.5	4.2	4.0	3.3	3.5	2.9	3.2
Louisiana . . .	1.3	1.6	2.1	3.1	3.7	4.8	4.2	2.5
Vermont . . .	.2	1.8	1.7	1.9	1.1	1.3	1.3	1.3
Utah . . .	1.1	.9	1.3	1.6	1.8	2.1	1.8	1.8
New Jersey . . .	1.5	1.2	1.4	1.2	1.1	1.2	.9	1.2
West Virginia . . .	1.7	1.5	1.5	1.8	1.5	1.4	1.7	1.1
Kentucky . . .	1.8	.9	1.7	1.7	1.7	1.5	1.7	1.1
Maryland . . .	1.0	1.1	1.2	1.1	1.0	1.1	.9	
New Mexico . . .	.6	.7	.8	.9	.8	1.0	.6	

Other states produced less than 1,000,000 bu.

period and about the same as in 1915-19, although improved seed was being more generally used. New varieties were more disease-resistant, and special varieties for the southern states increased production in that area. More commercial fertilizer was used with profitable results. The crop shifted with the competition of soybeans in the corn belt, the acreage declining in Illinois, Iowa, Ohio and Indiana while it increased rapidly in the Dakotas, Minnesota and Wisconsin. The proportion grown in the northeast and Appalachian states decreased.

The price of oats advanced more slowly than did other feed grains and did not advance to the same high levels. Through 1940 and 1941 oats averaged about the same as in the prewar period 1935-39. A sharp advance came in 1943, followed by a decline lasting through 1945, then another advance to a new high in 1946. The price of oats was supported by the government through loans on stored oats based upon the rates on corn and relative feeding values. The ceiling price of oats was raised five cents per bushel in May 1946. Stocks of oats were higher at the beginning of 1946 than in any previous year of record. The shortage of corn and barley was offset by the use of larger proportions of oats in mixed feeds, though oats were less desirable.

World oats production was confined largely to the United States, Canada and Argentina. The Argentine and Canadian crops were below average during most of the decade 1937-46, and since the grain did not enter largely into international trade, the demand was limited to that for domestic feed needs. Imports of 55,000,000 bu. to the United States were due to the feed shortage in 1942, and a larger import of 77,800,000 bu. occurred in 1944. Previous to 1939 the balance was in favour of exports. (J. C. Ms.)

BIBLIOGRAPHY.—For statistics of acreage, production see U.S. Dept. Agric., *Agricultural Statistics; Hdbk. Official Grain Standards* (1941).

Obituaries, 1937-46

The following men and women of prominence died

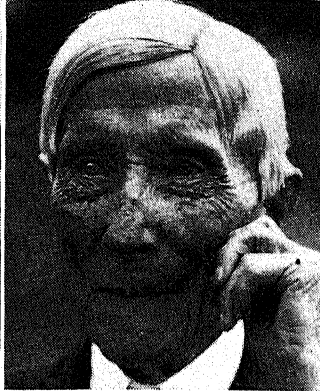
during the years 1937 to 1946, inclusive. The list is arranged in alphabetical order, year by year.

Name	Birth date	Death date
1937		
ABDULHALIK HAMID, Turkish poet	1852	Apr. 13
ADLER, ALFRED, Austrian psychologist	Feb. 7, 1870	May 28
ALDRICH, RICHARD, U.S. music critic	July 31, 1863	June 2
AMES, WINTHROP, U.S. theatrical producer	Nov. 25, 1871	Nov. 3
ARMSTRONG, HENRY EDWARD, British chemist	May 6, 1848	July 13
ASHTON, ALGERNON BENNET LANGTON, British composer	Dec. 9, 1859	Apr. 10
BAKER, GEORGE FISHER, U.S. financier	Mar. 19, 1878	May 30
BAKER, NEWTON DIEHL, U.S. secretary of war during World War I	Dec. 3, 1871	Dec. 25
BAQIR SIDQI PASHA, Iraqi statesman	1890	Aug. 12
BARBOUR, CLARENCE AUGUSTUS, U.S. clergyman	Apr. 21, 1867	Jan. 16
BARRIE, SIR JAMES MATTHEW, Scottish playwright	May 9, 1860	June 19
BAYLIS, LILIAN MARY, British theatre manager	May 9, 1874	Nov. 25
BINGHAM, ROBERT WORTH, U.S. ambassador to Great Britain	Nov. 8, 1871	Dec. 18
BISLETI, GAETANO, Italian cardinal	Mar. 20, 1856	Aug. 30
BLAKE, JOSEPH AUGUSTUS, U.S. surgeon	Aug. 31, 1864	Aug. 12
BORDEN, SIR ROBERT LAIRD, Canadian statesman	June 26, 1854	June 10
BOSE, SIR JAGADIS CHANDRA, Indian physicist	Nov. 30, 1858	Nov. 23
BOTHMER, COUNT FELIX VON, German army officer	Dec. 10, 1852	Mar. 19
BURLESON, ALBERT SIDNEY, U.S. postmaster general under President Wilson	June 7, 1863	Nov. 24
BUTLER, ELLIS PARKER, U.S. humorist	Dec. 5, 1869	Sept. 13
CARTER, MRS. LESLIE, U.S. actress	June 10, 1862	Nov. 13
CHAMBERLAIN, SIR (JOSEPH) AUSTEN, British statesman	Oct. 16, 1863	Mar. 16
COBURN, IVAH WILLS, U.S. actress	Sept. 6, 1873	Apr. 27
COFFIN, HOWARD EARLE, U.S. industrialist	Sept. 6, 1873	Nov. 21
CONWAY, WILLIAM MARTIN CONWAY, 1ST BARON, British art critic	Apr. 12, 1856	Apr. 19
COUBERTIN, BARON PIERRE DE FREDI DE, French author and originator of the modern Olympic games	Jan. 1, 1863	Sept. 2
COX, SIR PERCY ZACHARIAH, British administrator	Nov. 20, 1864	Feb. 20
CRANE, (ROBERT) BRUCE, U.S. landscape artist	Oct. 17, 1857	Oct. 30
CROISSET, FRANCIS DE, French playwright and author	Jan. 28, 1885	Nov. 8
CROZIER, FRANK PERCY, British army officer and pacifist	Jan. 9, 1879	Aug. 31
DALEN, GUSTAF, Swedish inventor	Nov. 30, 1869	Dec. 9
DALZIEL, JOHN SANDERSON, U.S. wood engraver	Dec. 24, 1839	Aug. 18
DAMROSCH, FRANK HEINO, U.S. musician and founder of the Institute of Musical Art	June 22, 1859	Oct. 22
DAVIDSOHN, ROBERT, German historian	Apr. 26, 1853	Sept. 18
DERNBURG, BERNHARD, German official and war propagandist	July 17, 1865	Oct. 15
DOUMERGUE, GASTON, French statesman	Aug. 1, 1863	June 18
DRINKWATER, JOHN, British poet and playwright	June 1, 1882	Mar. 25
EAMES, WILBERFORCE, U.S. bibliographer	Oct. 12, 1855	Dec. 6
EARHART, AMELIA, U.S. aviatrix	July 24, 1898	July 2
EDWARDS, ALFRED GEORGE, Welsh churchman and archbishop	Nov. 2, 1848	July 22
ERNLE, ROWLAND EDMUND PROTHERO, 1ST BARON, British agriculturist	Sept. 6, 1852	July 1
FILENE, EDWARD ALBERT, Boston merchant	Sept. 3, 1860	Sept. 26
FOOTE, ARTHUR WILLIAM, U.S. organist and composer	Mar. 5, 1853	Apr. 9
FORBES-ROBERTSON, SIR JOHNSTON, British actor	Jan. 16, 1853	Nov. 6
FRANKLIN, EDWARD CURTIS, U.S. chemist	Mar. 1, 1862	Feb. 13
GALLWITZ, MAX VON, German army officer	May 2, 1852	Apr. 19
GARDNER, PERCY, British archaeologist	Nov. 24, 1846	July 18
GARVAN, FRANCIS PATRICK, former U.S. custodian of alien property	June 13, 1875	Nov. 7
GAY, WALTER, U.S. painter	Jan. 22, 1856	July 15
GEDDES, SIR ERIC CAMPBELL, British industrialist	Sept. 26, 1875	June 22
GERSHWIN, GEORGE, U.S. composer	Sept. 26, 1898	July 11
GILLETTE, WILLIAM HOOKER, U.S. actor and playwright	July 2, 1855	Apr. 29
GLEAVES, ALBERT, U.S. admiral	Jan. 1, 1858	Jan. 6
GLEICHEN, LORD EDWARD, British army officer	Jan. 15, 1863	Dec. 15
GORDON, CHARLES WILLIAM, Canadian author and churchman	Sept. 13, 1860	Oct. 31
GREENOUGH, ROBERT BATTEY, U.S. surgeon	Nov. 9, 1871	Feb. 16
GUEST, FREDERICK EDWARD, British soldier and politician	June 14, 1875	Apr. 28



Alfred Adler (1870-1937); Newton D. Baker (1871-1937); James M. Barrie (1860-1937); Amelia Earhart (1898-1937)

Name	Birth date	Death date	Name	Birth date	Death date
HADLEY, HENRY KIMBALL, U.S. composer and conductor.	Dec. 20, 1871	Sept. 6	slovakian statesman	Mar. 7, 1850	Sept. 14
HADOW, SIR (WILLIAM) HENRY, British musician and educator	Dec. 27, 1859	Apr. 9	MASOOD, SIR SYED ROSS, Indian Moslem educationist.	Feb. 15, 1889	July 30
HAFID, MULAI, former Moroccan ruler.	Sept. 6, 1870	Aug. 21	MAYO, ADMIRAL HENRY THOMAS, U.S. naval officer.	Dec. 8, 1856	Feb. 23
HALEVY, ELIE, French philosopher	Mar. 28, 1868	Apr. 29	MELLON, ANDREW WILLIAM, U.S. statesman and financier	Mar. 24, 1855	Aug. 26
HAPGOOD, NORMAN, U.S. editor	Mar. 3, 1911	June 7	MILLS, OGDEN LIVINGSTON, former U.S. secretary of the treasury	Aug. 23, 1884	Oct. 11
HARLOW, JEAN (HARLEAN CARPENTER), U.S. motion picture actress.	Dec. 21, 1870	May 14	MOLA, GENERAL EMILIO, Spanish rebel	1887	June 3
HASKINS, CHARLES HOMER, U.S. mediaevalist.	July 9, 1870	Jan. 8	MORE, PAUL ELMER, U.S. critic and author	Dec. 12, 1864	Mar. 9
HAYDEN, CHARLES, U.S. financier	Mar. 17, 1859	Oct. 31	MORROW, JAY JOHNSON, U.S. soldier and administrator	Feb. 20, 1870	Apr. 16
HENEY, FRANCIS JOSEPH, U.S. criminal prosecutor	Aug. 17, 1870	Mar. 16	NORRIS, WILLIAM FOXLEY, dean of Westminster.	Feb. 4, 1859	Sept. 28
HOBSON, RICHMOND PEARSON, U.S. naval officer	Oct. 29, 1855	Aug. 10	OGDEN, ROLLO, U.S. journalist and editor	Jan. 19, 1856	Feb. 22
HODGE, JOHN, British trade union leader and first minister of labour	Dec. 1, 1854	Mar. 6	OLAYA HERRERA, ENRIQUE, Colombian statesman.	Nov. 12, 1881	Feb. 18
HORNADAY, WILLIAM TEMPLE, U.S. zoologist	Oct. 3, 1860	Aug. 6	ORDJONKIDZE, GREGORY KONSTANTINIVICH, Russian politician	1886	Feb. 18
HORNIMAN, ANNIE ELIZABETH FREDERICKA, British theatrical producer	May 3, 1853	Oct. 3	PAGE, THOMAS WALKER, U.S. economist	Dec. 4, 1866	Jan. 13
HOWE, EDGAR WATSON, U.S. editor and philosopher	Sept. 15, 1858	Mar. 12	PAINE, ALBERT BIGELOW, U.S. author.	July 10, 1861	Apr. 9
HUBAY, JENŐ DE, Hungarian violinist and composer	1870	Aug. 2	PATTON, RAYMOND STANTON, U.S. naval officer, director of Coast and Geodetic Survey	Dec. 29, 1882	Nov. 25
HUGHES-STANTON, SIR HERBERT, British landscape artist	June 23, 1870	Oct. 24	PEEL, WILLIAM ROBERT WELLESLEY	Jan. 7, 1867	Sept. 28
ISHERWOOD, SIR JOSEPH WILLIAM, British ship designer	Feb. 17, 1856	May 27	PEEL, 1ST BARON, British statesman	Aug. 23, 1861	Feb. 16
IVES, FREDERICK EUGENE, U.S. inventor	Sept. 19, 1859	Sept. 28	PERIN, CHARLES PAGE, U.S. metallurgist.	May 16, 1892	Sept. 21
JAMESON, JOHN FRANKLIN, U.S. historian.	Oct. 9, 1884	Jan. 13	PERKINS, OSGOOD, U.S. actor	Aug. 16, 1863	July 17
JOHNSON, MARTIN ELMER, U.S. explorer.	Jan. 12, 1853	Oct. 14	PIERNE, HENRI CONSTANT GABRIEL, French composer	Aug. 4, 1871	Apr. 28
JOHNSON, ROBERT UNDERWOOD, U.S. poet and editor	Dec. 22, 1856	Dec. 21	POLLARD, JOHN GARLAND, U.S. lawyer and administrator	Dec. 10, 1845	Jan. 18
KELLOGG, FRANK BILLINGS, former World Court justice and U.S. secretary of state.	Dec. 1, 1867	Aug. 8	POLLOCK, SIR FREDERICK, British legal expert	Dec. 6, 1863	Nov. 12
KELLOGG, VERNON LYMAN, U.S. zoologist	Dec. 27, 1860	May 26	POPE, JOHN RUSSELL, U.S. architect.	Apr. 24, 1874	Aug. 27
KRAMAR, KAREL, first Czechoslovakian premier	Mar. 25, 1863	June 5	RAVEL, MAURICE, French composer	Mar. 7, 1875	Dec. 28
KYLSANT, OWEN COSBY PHILIPPS, British shipping executive	June 1, 1869	Nov. 22	ROBINSON, HENRY MAURIS, U.S. banker	Sept. 12, 1868	Nov. 3
LASZLO DE LOMBOS, PHILIP ALEXIUS, naturalized British portrait painter	Oct. 31, 1861	Oct. 16	ROBINSON, JOSEPH TAYLOR, U.S. senate majority leader	Aug. 29, 1872	July 14
LEGOUIS, EMILE, French professor of English literature	Mar. 12, 1886	May 7	ROCKEFELLER, JOHN DAVISON, U.S. capitalist	July 8, 1839	May 23
LEHMANN, ERNST AUGUST, German dirigible expert.	Nov. 1, 1866	Sept. 28	ROOT, ELIHU, U.S. lawyer and statesman	Feb. 15, 1845	Feb. 7
LEMIEUX, RODOLPHE, Canadian statesman and legal expert	Oct. 6, 1868	Oct. 22	ROSE, SIR (HUGH) ARTHUR, Scottish educator and statesman	1875	Aug. 14
LORIMER, GEORGE HORACE, U.S. editor	Apr. 9, 1865	Dec. 20	ROTHSCHILD, LIONEL WALTER ROTHSCCHILD, 2ND BARON, British zoologist	Feb. 8, 1868	Aug. 27
LUDENDORFF, ERICH, German soldier	Nov. 25, 1868	Oct. 10	ROUSSEL, ALBERT, French composer	Apr. 5, 1869	Aug. 24
LUDWIG, ERNST, former grand duke of Hesse	1857	Sept. 24	RUBIO Y LLUCH, ANTONI, Spanish Catalan scholar	July 24, 1856	June 9
LUSTIG, ALESSANDRO, Italian pathologist.	Oct. 12, 1866	Nov. 9	RUNCIMAN, WALTER RUNCIMAN, 1ST BARON, British shipping executive	July 6, 1847	Aug. 13
MACDONALD, JAMES RAMSAY, British statesman.	Feb. 4, 1858	Apr. 26	RUTHERFORD, ERNEST RUTHERFORD, 1ST BARON, British physicist	Aug. 30, 1871	Oct. 19
MCDOWELL, WILLIAM FRASER, U.S. Methodist Episcopal bishop	Sept. 20, 1863	Mar. 22	SHEPPARD, HUGH RICHARD, canon of St. Paul's in London	1880	Oct. 31
MACMONNIES, FREDERICK WILLIAM, U.S. sculptor	1888	Aug. 14	SIMONS, WALTHER, German statesman	Sept. 24, 1861	July 15
MCNEILE, CYRIL, Lieut. Colonel, British author	Apr. 25, 1874	July 20	SMITH, ANNIE LORRAIN, British botanist.	Oct. 23, 1854	Sept. 7
MARCONI, MARCHESE GUGLIELMO	July 29, 1878	Dec. 29	SMITH, SIR GRAFTON ELIOT, British anthropologist.	Aug. 15, 1871	Jan. 1
MARCONI, Italian inventor	Mar. 27, 1892	Oct. 12	SMYTH, HERBERT WEIR, U.S. professor of Greek	Aug. 8, 1857	July 16
MARQUIS, DONALD ROBERT PERRY, U.S. humorist, poet and playwright			SNOWDEN, PHILIP SNOWDEN, 1ST VISCOUNT, British statesman	July 18, 1864	May 15
MARRINER, JAMES THEODORE, U.S. diplomat			SOMERVELL, SIR ARTHUR, British composer	June 5, 1863	May 2
MASARYK, THOMAS GARRIGUE, Czechoslovakian statesman			STEVENSON, JAMES ALEXANDER, British sculptor	Oct. 18, 1881	Oct. 5
			STIEGLITZ, JULIUS OSCAR, U.S. chemist	May 26, 1867	Jan. 10
			STRATHCARRON, IAN MACPHERSON, Scottish statesman	1880	Aug. 14
			SWIFT, SIR RIGBY, British jurist	1874	Oct. 19
			SZYMANOWSKI, KAROL, Polish composer.	1883	Mar. 29



George Gershwin (1898-1937); Guglielmo Marconi (1874-1937);
Maurice Ravel (1875-1937); John D. Rockefeller (1839-1937)

Name	Birth date	Death date
TANNER, HENRY OSSAWA, U.S. Negro painter	June 21, 1859	May 25
THOMSON, ELIHU, U.S. electrical engineer and inventor	Mar. 29, 1853	Mar. 13
THWING, CHARLES FRANKLIN, U.S. educator	Nov. 9, 1853	Aug. 29
TONKS, HENRY, British painter and art instructor	1862	Jan. 8
TUKHACHEVSKY, MIKHAIL NIKOLAEVICH, Russian marshal	1893	June 12
URIU, BARON SOTOKICHI, Japanese admiral	1857	Nov. 11
VANDERLIP, FRANK ARTHUR, U.S. banker	Nov. 17, 1864	June 29
WARBURG, FELIX M., U.S. financier and philanthropist	Jan. 14, 1871	Oct. 20
WHARTON, EDITH NEWBOLD JONES, U.S. novelist	Jan. 24, 1862	Aug. 11
WHITE, MAUDE VALERIE, British song composer	June 23, 1855	Nov. 2
WIDOR, CHARLES-MARIE, French organist and composer	Feb. 22, 1845	Mar. 12
WISE, THOMAS JAMES, British bibliographer of English authors	Oct. 7, 1859	May 13
ZACHRISSON, ROBERT EUGEN, Swedish professor of English	Jan. 15, 1880	July

1938

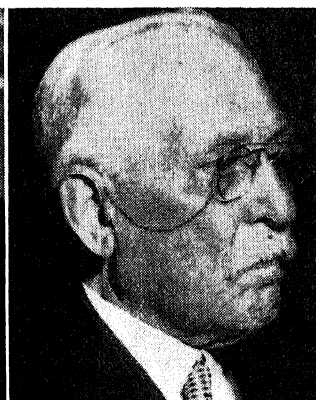
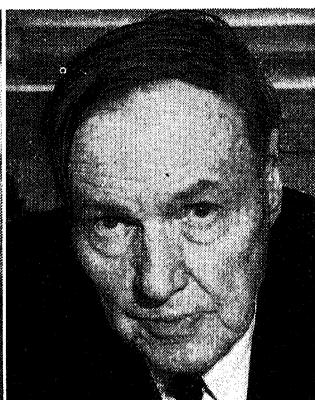
ABBOTT, YARNALL, U.S. painter and writer	1870	June 24
ABERCROMBIE, LASCELLES, British poet	Jan. 9, 1881	Oct. 27
AHEARN, THOMAS, Canadian engineer	June 24, 1855	June 28
ALEXANDER, SAMUEL, British philosopher	Jan. 6, 1859	Sept. 13
ALHUCEMAS, MARQUIS OF, Spanish premier	Dec. 15, 1860	Sept. 15
ANNUNZIO, GABRIELE D', Italian novelist	Mar. 12, 1864	Mar. 1
ARMSTRONG, SIR HARRY GLOSTER, former British consul general in New York city	Jan. 17, 1861	Feb. 6
ATATURK, KEMAL, president of Turkey	1881	Nov. 10
ATHOLSTAN, BARON, Canadian publisher	1848	Jan. 28
AVERESCU, ALEXANDRE, Rumanian statesman and World War I commander	Mar. 9, 1859	Oct. 2
BARNARD, GEORGE GREY, U.S. sculptor	May 24, 1863	Apr. 24
BARRETT, JOHN, U.S. economic adviser and diplomat	Nov. 28, 1866	Oct. 17
BARRON, LEONARD, U.S. horticulturist	Sept. 29, 1868	Apr. 9
BAUER, OTTO, Austrian politician	1881	July 4
BÉDIER, JOSEPH, French author and scholar	Jan. 28, 1864	Aug. 30
BOASE, WILLIAM NORMAN, Scottish golfing leader	Oct. 17, 1870	Mar. 7
BORCHARDT, LUDWIG, German Egyptologist	Oct. 5, 1863	Sept. 77
BRIDGES, CALVIN BLACKMAN, U.S. geneticist	Jan. 11, 1889	Dec. 27
BURRELL, MARTIN, Canadian librarian	Oct. 15, 1858	Mar. 20
CALVIN, EDGAR EUGENE, U.S. railroad magnate	Oct. 16, 1858	Mar. 17
CAPEK, KAREL, Czech playwright	Jan. 9, 1890	Dec. 25
CARDOZO, BENJAMIN NATHAN, associate justice of U.S. supreme court	May 24, 1870	July 9
CHADBOURNE, THOMAS LINCOLN, U.S. lawyer	1871	June 15
CHALIAPIN, FYODOR IVANOVICH, Russian opera singer	Feb. 1, 1873	Apr. 12
CLARK, JOHN BATES, U.S. economist	Jan. 26, 1847	Mar. 21
CODREANU, CORNELIU ZELEA, Rumanian politician	1899?	Nov. 30
COFFMAN, LOTUS DELTA, president, University of Minnesota	Jan. 7, 1875	Sept. 22
COHEN, SIR LEONARD LIONEL, British banker and philanthropist	Apr. 17, 1858	Apr. 10
COMPTON, ELIAS, U.S. educator	Aug. 3, 1856	May 2
CONNAUGHT, PRINCE ARTHUR OF, British statesman	Jan. 13, 1883	Sept. 12
COOPER, DEXTER PARSHALL, U.S. hydraulic engineer	July 10, 1880	Feb. 2

Name	Birth date	Death date
COPELAND, ROYAL SAMUEL, U.S. senator and physician	Nov. 7, 1868	June 17
COSTER, FRANK DONALD (PHILIP MUSIC)	1877	Dec. 16
COVADONGA, COUNT OF, former heir to Spanish throne	May 10, 1907	Sept. 6
CRANE, RICHARD, U.S. diplomat	Aug. 12, 1882	Oct. 3
DAGGETT, AARON SIMON, U.S. army officer	June 14, 1837	May 14
DARROW, CLARENCE SEWARD, U.S. lawyer	Apr. 18, 1857	Mar. 13
DAVIES, SIR JOHN THOMAS, British aide to Lloyd George in World War I	May 9, 1881	Apr. 1
DEGOUTTE, JOSEPH, French general	Apr. 18, 1866	Oct. 31
DEVONSHIRE, DUKE OF, British statesman	May 31, 1868	May 6
DUFFIELD, EDWARD DICKINSON, U.S. insurance executive	Mar. 3, 1871	Sept. 17
DURVEA, CHARLES E., U.S. inventor	Dec. 15, 1861	Sept. 28
EAST, EDWARD MURRAY, U.S. biologist	Oct. 4, 1879	Nov. 9
EDSTROM, DAVID, Swedish-U.S. sculptor	Mar. 27, 1873	Aug. 12
EDWARDS, HARRY STILLWELL, U.S. novelist	Apr. 23, 1855	Oct. 22
ELGIN, WILLIAM FRANKLIN, U.S. physician and bacteriologist	1862	Apr. 18
FILIPPI, FILIPPO DE, Italian scientist and explorer	Apr. 6, 1869	Sept. 27
FIRESTONE, HARVEY SAMUEL, U.S. rubber manufacturer	Dec. 20, 1868	Feb. 7
FLANDRAU, CHARLES MACOMB, U.S. essayist	Dec. 9, 1871	Mar. 28
FRANCO, RAMÓN, Spanish aviator	1896?	Oct. 28
FRANZ I, prince of Liechtenstein	Aug. 28, 1853	July 25
FREDERICK, PAULINE, U.S. actress	Aug. 12, 1885	Sept. 19
FROBENIUS, LEO, German explorer and ethnologist	June 29, 1873	Aug. 9
FROST, WADE HAMPTON, U.S. epidemiologist	Mar. 3, 1880	Apr. 30
FULLER, EDWARD, U.S. journalist	June 30, 1860	Apr. 29
FURUSETH, ANDREW, U.S. labour leader	Mar. 12, 1854	Jan. 22
GALE, ZONA, U.S. author	Aug. 26, 1874	Dec. 27
GAVIN, FRANK STANTON B., U.S. clergyman and scholar	Oct. 31, 1890	Mar. 20
GILBERT, SEYMOUR PARKER, U.S. banker	Oct. 13, 1892	Feb. 23
GLUCK, ALMA, U.S. operatic singer	May 11, 1884	Oct. 27
GODOWSKY, LEOPOLD, Russian-U.S. composer and pianist	Feb. 13, 1870	Nov. 21
GOGA, OCTAVIAN, Rumanian poet and statesman	1881	May 7
GONZAGA, MAURIZIO, Italian prince	Sept. 21, 1861	Mar. 24
GRAYSON, CARY TRAVERS, U.S. naval officer	Oct. 11, 1878	Feb. 15
GREENOUGH, CHESTER NOYES, U.S. educator	June 29, 1874	Feb. 27
GREGG, WILLIS RAY, U.S. meteorologist	Jan. 4, 1880	Sept. 14
HALE, GEORGE ELLERY, U.S. astronomer	June 29, 1868	Feb. 21
HAMLIN, CHARLES SUMNER, U.S. lawyer	Aug. 30, 1861	Apr. 24
HAMMOND, WILLIAM ALEXANDER, U.S. educator	May 20, 1861	May 6
HAWKE, BARON, British cricket authority	Aug. 16, 1860	Oct. 10
HAWKS, FRANK MONROE, U.S. aviator	Mar. 28, 1897	Aug. 23
HAYES, PATRICK JOSEPH, U.S. cardinal	Nov. 20, 1867	Sept. 4
HEATH, THOMAS K., U.S. comedian	Aug. 11, 1853	Aug. 18
HERRESHOFF, NATHANIEL GREENE, U.S. ship designer	1848	June 2
HERTY, CHARLES HOLMES, U.S. chemist	Dec. 4, 1867	July 27
HLINKA, ANDREUS, Slovak political leader	Sept. 27, 1864	Aug. 16
HOOKE, ELON HUNTINGTON, U.S. civil engineer	Nov. 23, 1869	May 10
HOUSE, EDWARD MANDELL, U.S. statesman	July 26, 1858	Mar. 28
HULSE, HIRAM RICHARD, Protestant Episcopal bishop	Sept. 15, 1868	Apr. 10

Name	Birth date	Death date
IBN SAUD, PRINCE HADJI TAHAR BEN MOHAMMED WAHABI, Arabian adventurer	1830	Mar. 17
INSULL, SAMUEL, U.S. utilities executive	Nov. 11, 1859	July 16
IRWIN, MAY, U.S. actress	June 27, 1862	Oct. 22
JAMMES, FRANCIS, French poet and novelist	Dec. 2, 1868	Nov. 1
JOHNSON, JAMES WELDON, U.S. Negro poet, composer and educator	June 17, 1871	June 26
KANO, JIGORO, Japanese educator and athlete	1860	May 4
KARAGEORGEVICH, ARSENE, Yugoslavian prince	Apr. 16, 1859	Oct. 19
KAUTSKY, KARL, German Socialist	Oct. 16, 1854	Oct. 17
KLAUDER, CHARLES ZELLER, U.S. architect	Feb. 9, 1872	Oct. 30
KNAPP, BRADFORD, U.S. educator	Dec. 24, 1870	June 11
KOEHL, HERMANN, pioneer German transatlantic flier	Apr. 16, 1888	Oct. 7
KRAMER, GEORGE WASHINGTON, U.S. architect	July 9, 1847	Oct. 20
KUNZ, JAKOB, U.S. mathematical physicist	Nov. 3, 1874	July 18
KUPRIN, ALEXANDER IVANOVICH, Russian novelist	1870	Aug. 25
LA FARGE, CHRISTOPHER GRANT, U.S. architect	Jan. 5, 1862	Oct. 11
LENGLEN, SUZANNE, French tennis player	May 24, 1899	July 4
LEWISOHN, ADOLPH, U.S. broker and philanthropist	May 27, 1849	Aug. 17
LOVAT-FRASER, JAMES ALEXANDER, British politician	Mar. 16, 1868	Mar. 21
LUCAS, EDWARD VERRALL, British essayist	1865	June 26
MACDONNELL, NORMAN SCARTH, Canadian jurist	Sept. 4, 1886	Apr. 7
MCDUGALL, WILLIAM, U.S. psychologist	June 22, 1871	Nov. 28
MCDOWELL, WILLIAM G., U.S. Episcopal bishop	Aug. 2, 1882	Mar. 20
MCINTYRE, OSCAR ODD, U.S. newspaper columnist	Feb. 18, 1884	Feb. 14
MACKAY, CLARENCE HUNGERFORD, U.S. telegraph and cable executive	Apr. 17, 1874	Nov. 13
MACKENZIE, ARTHUR STANLEY, Canadian educator	Sept. 20, 1865	Oct. 2
MACKENZIE, LORD, Scottish judge	Mar. 9, 1857	Apr. 2
McKENZIE, ROBERT TAIT, Canadian physician, sculptor, educator	May 26, 1867	Apr. 28
McNEILL, JAMES, Irish statesman	Mar. 27, 1869	Dec. 12
MARIE, dowager queen of Rumania	Oct. 29, 1875	July 18
MARTIN, EDWARD, U.S. surgeon and educator	1859	Mar. 17
MATILE, LEON A., U. S. army officer	Sept. 28, 1844	Apr. 10
MAUD, queen of Norway	Nov. 26, 1869	Nov. 20
MAXWELL, WILLIAM BABINGTON, British author	1866?	Aug. 4
MEANS, GASTON B., U.S. adventurer	1879	Dec. 12
MICHALAKOPOULOS, ANDREAS, Greek statesman	1875	Mar. 27
MILFORD HAVEN, MARQUESS OF, British naval officer	Nov. 6, 1892	April 8
MOND, SIR ROBERT LUDWIG, British industrialist	Sept. 9, 1867	Oct. 22
MURAT, JOACHIM, French soldier and politician	Aug. 6, 1885	May 12
MUSICK, EDWIN C., U.S. aviator	1894	Jan. 11
NEILL, DUNCAN FERGUSON, British army engineer and yachtsman	1868	Apr. 20
NEWBOLT, SIR HENRY JOHN, British naval historian and poet	June 6, 1862	Apr. 20
NICHOLAS OF GREECE, PRINCE, Greek painter	Jan. 22, 1872	Feb. 8
NOBLE, WILLIAM CLARK, U.S. sculptor and painter	Feb. 10, 1858	May 10
OLAND, WARNER, U.S. motion picture actor	Oct. 3, 1880	Aug. 6

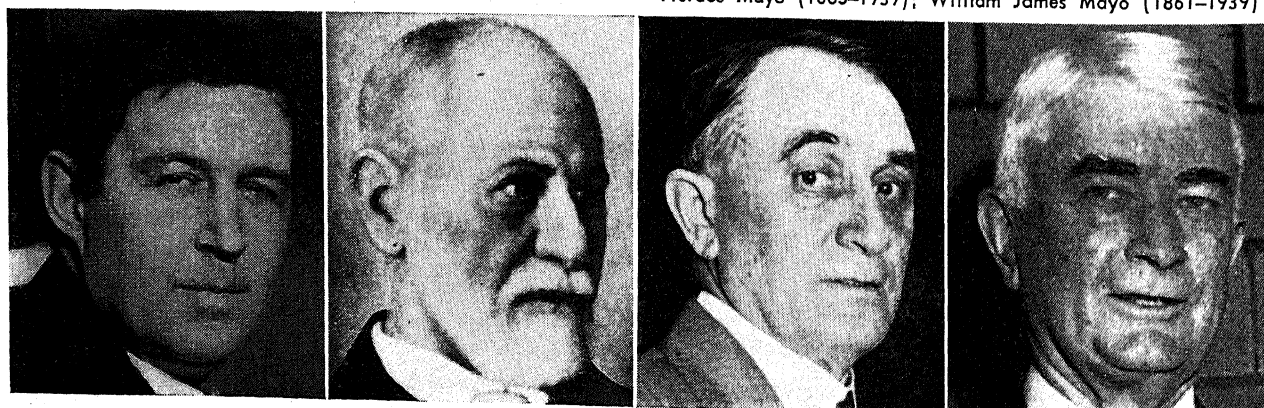
Name	Birth date	Death date
OSSIETZKY, CARL VON, German pacifist writer	Dec. 10, 1890	May 4
PALACIO VALDES, ARMANDO, Spanish novelist and critic	1853	Feb. 3
PARKS, LEIGHTON, U.S. clergyman	Feb. 10, 1852	Mar. 21
PATIALA, MAHARAJAH OF, Indian ruler	Oct. 12, 1891	Mar. 23
PATTERSON, ROSS VERNET, U.S. medical educator	Oct. 5, 1877	May 2
PEABODY, GEORGE FOSTER, U.S. banker and philanthropist	July 27, 1852	Mar. 4
PEASE, FRANCIS GLADHEIM, U.S. astronomer	Jan. 14, 1881	Feb. 7
PERLEY, SIR GEORGE HALSEY, Canadian statesman	Sept. 12, 1857	Jan. 4
PHELPS, WILLIAM WOODWARD, U.S. naval officer	Nov. 26, 1869	May 11
PICKERING, WILLIAM HENRY, U.S. astronomer	Feb. 15, 1858	Jan. 21
PICOT, YVES, French soldier and statesman	Mar. 17, 1862	Apr. 19
POWELL, FREDERICK EUGENE, U.S. magician	Mar. 1, 1856	Feb. 27
PRENTISS, JOHN WING, U.S. banker	Aug. 15, 1875	Mar. 18
QUINTERO, SERAFIN ALVAREZ, Spanish playwright	1871	Apr. 12
RABINOWITZ, OSHEAH, Ukrainian orthodox leader	1860	Apr. 27
RADER, PAUL, U.S. evangelist	Aug. 24, 1879	July 19
ROMANOFF, CYRIL VLADIMIROVICH, grand duke and pretender to Russian throne	Sept. 30, 1876	Oct. 12
RONALD, SIR LANDON, British conductor	June 7, 1873	Aug. 14
ROOTHAM, CYRIL BRADLEY, British composer	1875	Mar. 18
ROSS, PERLEY ASON, U.S. physicist	Apr. 6, 1883	Mar. 20
RYDER, ARTHUR W., U.S. professor of Sanskrit	Mar. 8, 1877	Mar. 21
RYKOV, ALEXEI IVANOVICH, Russian politician	1881	Mar. 15
SCHWEINITZ, GEORGE EDMUND DE, U.S. eye specialist	Oct. 26, 1858	Aug. 22
SCOTT, WALTER, Canadian publisher and politician	Oct. 27, 1867	Mar. 23
SEGAR, ELZIE CRISLER, U.S. cartoonist	Dec. 8, 1894	Oct. 13
SHEFFIELD, JAMES ROCKWELL, U.S. diplomat	Aug. 13, 1864	Sept. 2
SHEPARD, HELEN MILLER GOULD, U.S. philanthropist	June 20, 1868	Dec. 21
SICILIANI, FOMENICO, Italian army officer	May 1, 1879	May 6
SMITH, JOSHUA, British artist	1880	Mar. 26
SQUIRE, ROSE ELIZABETH, British civil servant	1861	Apr. 15
STANISLAVSKY, Russian theatrical producer	Jan. 1863	Aug. 7
STANLEY, LORD, British sec'y of state for dominions	July 9, 1894	Oct. 16
STANTON, SIR (AMBROSE) THOMAS, Canadian scientist	Nov. 14, 1875	Jan. 25
STEELE, HARRY LEE, retired U.S. army officer	June 28, 1874	Mar. 31
STEPHENS, KATE, U.S. author	Feb. 27, 1853	May 10
STERN, LOUIS WILLIAM, German psychologist	1871	Mar. 27
STOTESBURY, EDWARD TOWNSEND, U.S. banker	Feb. 26, 1849	May 16
STRATHMORE AND KINGHORNE, COUNTESS OF, mother of Queen Elizabeth	Sept. 11, 1862	June 23
STRAUSS, JOSEPH BAERMANN, U.S. engineer	Jan. 9, 1870	May 16
SUTHERLAND, LAURA ALBERTA, U.S. actress	1863	Mar. 17
SWYNNERTON, CHARLES FRANCIS MASY, British director of tsetse-fly research	Dec. 3, 1877	June 12
TANG SHAO-YI, Chinese statesman	1860	Sept. 30
TARBELL, EDMUND C., U.S. portrait painter	Apr. 26, 1862	Aug. 1
TAYLOR, GRAHAM, U.S. sociologist	May 2, 1851	Sept. 26

Kemal Atatürk (1881-1938); Clarence Darrow (1857-1938); Samuel Insull (1859-1938); Stanislavsky (1863-1938)



Name	Birth date	Death date	Name	Birth date	Death date
TEN EYCK, JAMES A., dean of U.S. oarsmen . . .	Oct. 16, 1851	Feb. 11	soldier	Mar. 23, 1904	Aug. 23
TERRY, SIR RICHARD RUNCIMAN, British musician	1865	Apr. 18	BUTLER, PIERCE, associate justice of U.S. supreme court	Mar. 17, 1866	Nov. 16
THOMAS, HUGH LLOYD, British diplomat . . .	Apr. 28, 1888	Feb. 22	CABOT, DR. RICHARD CLARKE, U.S. physician	May 21, 1868	May 8
TORLONIA, GIOVANNI, PRINCE OF, Italian nobleman	Oct. 10, 1873	Apr. 8	CALINESCU, ARMAND, Rumanian statesman	May 22, 1893	Sept. 21
TROUBETSKOI, PRINCE PAUL, Russian sculptor	1866	Feb. 13	CARTER, HOWARD, British Egyptologist	1873	Mar. 2
TRUMBIC, ANTE, Yugoslav statesman	1863	Nov. 18	CEDILLO, SATURNINO, Mexican rebel general	(?)	Jan. 11
TUCK, EDWARD, U.S. banker and philanthropist	Aug. 24, 1842	Apr. 30	CESPEDES Y QUESADA, CARLOS MANUEL DE, Cuban statesman	Aug. 12, 1871	Mar. 28
VANDERVELDE, EMILE, Belgian Socialist statesman	Jan. 25, 1866	Dec. 27	CHANDLER, CHARLES DE FOREST, U.S. aeronautics expert	Dec. 24, 1878	May 18
VIZETELLY, FRANK HORACE, U.S. lexicographer	Apr. 2, 1864	Dec. 20	CIANO, COSTANZO, Italian statesman	Aug. 30, 1876	June 26
WARWICK, FRANCES, COUNTESS OF, British Socialist leader	Dec. 10, 1861	July 26	COLLIER, BARRON, U.S. advertising executive	Mar. 23, 1873	Mar. 13
WATERMAN, FRANK DAN, U.S. industrialist and philanthropist	July 30, 1869	May 6	COLVILLE, SIR STANLEY (CECIL JAMES), British admiral	Feb. 21, 1861	Apr. 9
WEAVER, JOHN VAN ALSTYN, U.S. author . . .	July 17, 1893	June 14	COMISKEY, JOHN LOUIS, U.S. baseball executive	Aug. 12, 1885	July 18
WESTOVER, OSCAR, chief, U.S. army air corps	July 23, 1883	Sept. 21	COSTIGAN, EDWARD PRENTISS, U.S. senator	July 1, 1874	Jan. 17
WHITE, PEARL, U.S. motion picture actress	Mar. 4, 1897	Aug. 4	COWLES, HENRY CHANDLER, U.S. botanist	Feb. 27, 1869	Sept. 12
WILSON, FRANCIS VAUX, U.S. illustrator and artist	1875	Apr. 17	CRANE, CHARLES RICHARD, U.S. diplomat	Aug. 7, 1858	Feb. 15
WISTER, OWEN, U.S. author	July 14, 1860	July 21	CRISTEA, MIRON, Rumanian patriarch and statesman	July 20, 1868	Mar. 6
WOLFE, THOMAS CLAYTON, U.S. novelist . . .	Oct. 3, 1900	Sept. 15	CROSELY, WALTER SELWYN, U.S. rear admiral	Oct. 30, 1871	Jan. 6
WOOLSEY, ROBERT, U.S. motion picture comedian	Aug. 14, 1889	Oct. 31	CUSHING, DR. HARVEY, U.S. brain surgeon	Apr. 8, 1869	Oct. 7
YAGODA, NIKOLAI, Russian politician	1891	Mar. 14	DARANYI, KOLOMAN, Hungarian statesman	Mar. 22, 1886	Nov. 1
YOHE, MAY, U.S. actress	Apr. 6, 1869	Aug. 28	DAVIES, JOHN VIPOND, U.S. civil engineer	Oct. 13, 1862	Oct. 4
YOUNG, ALEXANDER BELL FILSON, British journalist	1876	Apr. 19	DAWSON-WATSON, DAWSON, U.S. painter	July 21, 1864	Sept. 3
ZANGWILL, LOUIS, British writer	July 25, 1869	May 31	DETERDING, SIR HENRI WILHELM AUGUST, Dutch oil executive	Apr. 19, 1866	Feb. 4
ZOLOTKOFF, LEON, U.S. Zionist leader . . .	May 15, 1868	July 31	DMOWSKI, ROMAN, Polish statesman	Aug. 9, 1864	Jan. 2
1939					
ABBOTT, GRACE, U.S. social worker	Nov. 17, 1878	June 19	DOHERTY, HENRY L., U.S. industrialist and philanthropist	May 15, 1870	Dec. 26
ABERDEEN AND TEMAIR, ISHBEL MARIA, DOWAGER MARCHIONESS OF, British philanthropist and author	1857	Apr. 18	DOLAN, REV. FRANCIS JAMES, U.S. educator	July 14, 1893	Sept. 6
ADAMS, JOHN TAYLOR, U.S. political leader	Dec. 22, 1862	Oct. 28	DOLCI, ANGELO MARIA, Italian cardinal	July 12, 1867	Sept. 14
ARBÓS, E. FERNANDEZ, Spanish musician	Dec. 25, 1863	June 10?	DONNELLY, CHARLES, U.S. railroad executive	Nov. 9, 1869	Sept. 4
AROSEMENA, JUAN DEMOSTENES, Panamanian statesman	1879	Dec. 15	DUEVEN, BARON (JOSEPH DUEVEN), British art dealer	Oct. 14, 1869	May 25
BACKHOUSE, SIR ROGER ROLAND CHARLES, British admiral	Nov. 24, 1878	July 15	DYSON, SIR FRANK (WATSON), British astronomer	Jan. 8, 1868	May 25
BAKER, THOMAS STOCKHAM, U.S. educator	Mar. 23, 1871	Apr. 7	EARLE, RALPH, U.S. rear admiral and educator	May 3, 1874	Feb. 13
BARODA, MAHARAJA GAEKWAR, SIR SAYAJI RAO III, Indian prince	Mar. 10, 1863	Feb. 6	EASLEY, RALPH MONTGOMERY, U.S. political economist	Feb. 25, 1856	Sept. 7
BARTON, DONALD CLINTON, U.S. geologist	June 29, 1889	July 8	ELLIS, (HENRY) HAVELOCK, British psychologist and author	Feb. 2, 1859	July 8
BARZILAI, SALVATORE, Italian senator	July 5, 1860	May 1	FAIRBANKS, DOUGLAS ELTON, SR., U.S. motion picture actor	May 23, 1883	Dec. 12
BATES, ERNEST SUTHERLAND, U.S. historian and critic	Oct. 14, 1879	Dec. 4	FARRAND, DR. LIVINGSTONE, U.S. educator	June 14, 1867	Nov. 8
BENSON, SIR FRANK ROBERT, British actor	Nov. 4, 1858	Dec. 31	FAWCETT, GEORGE D., U.S. actor	Aug. 25, 1860	June 6
BERNSTORFF, COUNT JOHANN HEINRICH VON, German diplomat	Nov. 14, 1862	Oct. 6	FEARN, DR. ANNE WALTER, U.S. physician	1867?	Apr. 28
BLEDSE, SAMUEL THOMAS, U.S. railroad executive	May 12, 1868	Mar. 8	FECHNER, ROBERT, U.S. director of Civilian Conservation corps	Mar. 22, 1876	Dec. 31
BRADY, ALICE, U.S. actress	Nov. 2, 1892	Oct. 28	FINCK, HERMAN, British composer	Nov. 4, 1872	Apr. 21
BREGUET, JACQUES EUGENE, French aircraft designer	Apr. 23, 1881	Mar. 21	FISHER, CARL G., U.S. real estate executive	Jan. 12, 1874	July 15
BRIDGE, JAMES HOWARD, U.S. author	May 8, 1856	May 28	FITZGERALD, FRANK DWIGHT, U.S. governor	Jan. 27, 1885	Mar. 16
BRISTOL, MARK LAMBERT, U.S. admiral	Apr. 17, 1868	May 13	FOKKER, ANTHONY HERMAN GERARD, Dutch aeronautics engineer	Apr. 6, 1890	Dec. 23
BROWN, HEYWOOD (CAMPBELL), U.S. author and journalist	Dec. 7, 1888	Dec. 18	FORD, FORD MADOX, British author	1873	June 26
BRUBACHER, ABRAM ROYER, U.S. educator	July 27, 1870	Aug. 23	FRANKLIN, PHILIP ALBRIGHT SMALL, U.S. shipping executive	Feb. 1, 1871	Aug. 14
BRUCE, CHARLES GRANVILLE, British explorer	Apr. 7, 1866	July 12	FREUD, SIGMUND, Austrian psychoanalyst	May 6, 1856	Sept. 23
BUSCH, GERMAN, Bolivian statesman and			FRITSCH, WERNER VON, German general	Aug. 4, 1880	Sept. 22
			FULDA, LUDWIG, German playwright	July 15, 1862	Mar. 30
			GASTER, MOSES, British-Rumanian Hebrew scholar	1856	Mar. 5

Heywood Broun (1888-1939); Sigmund Freud (1856-1939); Charles Horace Mayo (1865-1939); William James Mayo (1861-1939)



Name	Birth date	Death date
GATES, REV. MILO HUDSON, U.S. clergyman	June 29, 1866	Nov. 27
GAY, DR. FREDERICK PARKER, U.S. pathologist	July 22, 1874	July 14
GHAZI IBN FEISAL, king of Iraq	Mar. 21, 1912	Apr. 4
GIBBONS, FLOYD (PHILLIPS), U.S. war correspondent	July 16, 1887	Sept. 24
GILBERT, PRENTISS BAILEY, U.S. diplomat	Oct. 3, 1883	Feb. 24
GILMAN, LAWRENCE, U.S. critic and author	July 5, 1878	Sept. 9
GOODNOW, FRANK JOHNSON, U.S. educator	Jan. 18, 1859	Nov. 14
GORDON, SIR CHARLES BLAIR, Canadian financier	Nov. 22, 1867	July 30
GRANGER, ALFRED HOYT, U.S. architect	May 31, 1867	Dec. 3
GRAY, CARL RAYMOND, U.S. railroad executive	Sept. 28, 1867	May 9
GREY, ZANE, U.S. author	Jan. 31, 1875	Oct. 23
GRINNELL, JOSEPH, U.S. zoologist	Feb. 27, 1877	May 29
GROENER, WILHELM, German general	Nov. 22, 1867	May 4
GUGGENHEIM, MURRY, U.S. financier and philanthropist	Aug. 12, 1858	Nov. 15
HAAB, ROBERT, Swiss statesman	Aug. 8, 1865	Oct. 15
HALLIBURTON, RICHARD, U.S. author	Jan. 9, 1900	Mar. 23?
HEATH, LADY MARY (MRS. G. A. R. WILLIAMS), British aviatrix	1895?	May 9
HELLER, EDMUND, U.S. naturalist	May 21, 1875	July 18
HOWARD, SIDNEY COE, U.S. dramatist	June 26, 1891	Aug. 23
HOWARD OF PENRITH, ESME WILLIAM		
HOWARD, 1ST BARON, British diplomat	Sept. 15, 1863	Aug. 1
HSU SHIH-CHANG, Chinese statesman	1858	June 5
JASPAR, HENRI, Belgian statesman	July 28, 1870	Feb. 15
JOHNSON, ROYAL CLEAVES, U.S. congressman	Oct. 3, 1882	Aug. 2
KALICH, BERTHA, Polish-U.S. actress	1874?	Apr. 18
KELLY, WALTER C., U.S. actor	Oct. 29, 1873	Jan. 6
KENNELLY, ARTHUR EDWIN, U.S. electrical engineer	Dec. 17, 1861	June 18
KRUPSKAYA, NADEZHDA KONSTANTINOVNA, Russian educator and widow of Lenin	Feb. 26, 1869	Feb. 27
LAEMMLE, CARL, SR., U.S. motion picture executive	Jan. 17, 1867	Sept. 24
LAMBERT, DR. ALEXANDER, U.S. physician and narcotics specialist	Dec. 15, 1861	May 9
LANGSDORFF, HANS, German naval officer	Mar. 20, 1894	Dec. 20
LAVELLE, REV. MICHAEL J., U.S. clergyman	May 30, 1856	Oct. 17
LEDERER, EMIL, German economist	Aug. 22, 1882	May 29
LEWIS, JAMES HAMILTON, U.S. senator	May 18, 1866?	Apr. 9
LINDEMANN, FERDINAND VON, German mathematician	Apr. 12, 1852	Mar. 7
LINDGREN, WALDEMAR, U.S. geologist	Feb. 14, 1860	Nov. 3
LINEBARGER, PAUL MYRON WENTWORTH, U.S. jurist	June 15, 1871	Feb. 20
LINN, JAMES WEBER, U.S. educator, legislator and writer	May 11, 1876	July 16
LINTON, EDWIN, U.S. biologist	Mar. 14, 1855	June 4
LIPMAN, JACOB GOODALE, U.S. agricultural chemist	Nov. 18, 1874	Apr. 19
LOGAN, MARVEL MILLS, U.S. senator	Jan. 7, 1874	Oct. 3
LOUISE, PRINCESS (DUCHESS OF ARGYLL), British princess	Mar. 18, 1848	Dec. 3
LYONS, JOSEPH ALOYSIUS, Australian statesman	Sept. 15, 1879	Apr. 7
MACHADO Y MORALES, GERARDO, Cuban politician	Sept. 29, 1871	Mar. 29
MACKAY, WILLIAM ANDREW, U.S. painter	July 10, 1876	July 26
McMILLAN, JOHN, British Salvation Army officer	1873	Sept. 22
McREYNOLDS, SAMUEL DAVIS, U.S. legislator	Apr. 16, 1872	July 11
MARIANI, DOMENIC, Italian cardinal	Apr. 3, 1863	Apr. 23
MARTIN, EDWARD SANDFORD, U.S. author and editor	Jan. 2, 1856	June 13
MARTIN, HELEN REIMENSNYDER, U.S. author	Oct. 18, 1868	June 29
MASON, WALT, U.S. writer	May 4, 1862	June 22
MAX, ADOLPHE, Belgian burgomaster	Dec. 31, 1869	Nov. 6
MAYO, DR. CHARLES HORACE, U.S. surgeon	July 19, 1865	May 26
MAYO, DR. WILLIAM JAMES, U.S. surgeon	June 29, 1861	July 28
MENDELSON, CHARLES JASTROW, U.S. cryptographer and philologist	Dec. 8, 1880	Sept. 27
MERCER, BERYL, U.S. actress	1882	July 28
MERRICK, LEONARD, British author	Feb. 21, 1864	Aug. 7
MILLER, JOSEPH DANA, U.S. economist	July 1, 1864	May 8
MONDELL, FRANK WHEELER, U.S. legislator	Nov. 6, 1860	Aug. 6
MOORE, HUGH KELSEA, U.S. chemical engineer	Jan. 3, 1872	Dec. 18
MUNDELEIN, GEORGE WILLIAM, U.S. cardinal	July 2, 1872	Oct. 2
NAISMITH, JAMES A., U.S. physical director	Nov. 6, 1861	Nov. 28
NEUMANN, DR. HEINRICH, Austro-Hungarian otologist	June 16, 1873	Nov. 6
Ogilvie, ALBERT GEORGE, premier of Tasmania	Mar. 10, 1891	June 11
OLIPHANT, HERMAN, general counsel of U.S. treasury department	Aug. 31, 1884	Jan. 11
PARK, DR. WILLIAM HALLOCK, U.S. public health authority	Dec. 30, 1863	Apr. 6

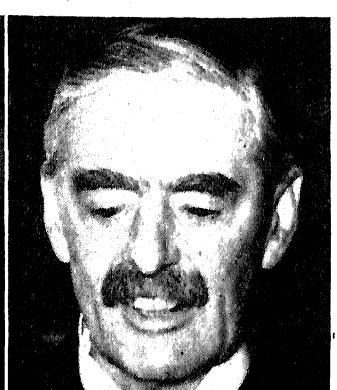
Name	Birth date	Death date
PARSONS, WILLIAM EDWARD, U.S. architect	June 19, 1872	Dec. 17
PEARSON, ALFRED JOHN, U.S. educator and diplomat	Sept. 29, 1869	Aug. 10
PIUS XI, Pope	May 31, 1857	Feb. 10
POND, IRVING KANE, U.S. architect	May 1, 1857	Sept. 29
POPE, SIR WILLIAM JACKSON, British chemist	Mar. 31, 1870	Oct. 17
PRITCHETT, HENRY SMITH, U.S. educator and scientist	Apr. 16, 1857	Aug. 28
PULITZER, RALPH, U.S. publisher	June 11, 1879	June 14
RACKHAM, ARTHUR, British illustrator	Sept. 19, 1867	Sept. 6
READ, OPIE, U.S. author	Dec. 22, 1852	Nov. 2
RICHTMYER, FLOYD KARKER, U.S. physicist	Oct. 12, 1881	Nov. 7
RINFRET, FERNAND, Canadian statesman	Feb. 28, 1883	July 12
ROGERS, JAMES HARVEY, U.S. economist	Sept. 25, 1886	Aug. 13
ROSS, JAMES DELMAGE, U.S. engineer	Nov. 9, 1871	Mar. 14
ROSS, JOHN DAWSON, U.S. author and librarian	Oct. 23, 1853	Oct. 29
RUPPERT, JACOB, U.S. brewing and baseball executive	Aug. 5, 1867	Jan. 13
SAITO, HIROSI, Japanese diplomat	Dec. 24, 1886	Feb. 26
SARGENT, JOHN GARIBALDI, U.S. attorney general	Oct. 13, 1860	Mar. 5
SASSOON, SIR PHILIP (ALBERT GUSTAVE DAVID), British statesman	Dec. 4, 1888	June 3
SAUVEUR, ALBERT, U.S. metallurgist	June 21, 1863	Jan. 26
SBARRETTI, DONATO, Italian cardinal	Nov. 12, 1856	Apr. 1
SCHIEDEMANN, PHILIPP, German statesman	July 26, 1865	Nov. 29
SCHELLING, ERNEST HENRY, U.S. musician	July 26, 1876	Dec. 8
SCHNEIDER, HERMAN, U.S. engineer and educator	Sept. 12, 1872	Mar. 28
SCHWAB, CHARLES MICHAEL, U.S. industrialist	Feb. 18, 1862	Sept. 18
SELIGMAN, EDWIN R. A., U.S. economist	Apr. 25, 1861	July 18
SIMPSON, JAMES, U.S. business executive and civic leader	Jan. 26, 1874	Nov. 25
SLAWEK, WALERY, Polish statesman	Apr. 2, 1879	Apr. 3
SNELLING, CHARLES MERCER, U.S. educator	Nov. 3, 1862	Sept. 19
SNIJERS, CORNELIS JACOBUS, Dutch army officer	Sept. 29, 1852	May 26
SPINGARN, JOEL ELIAS, U.S. professor and author	May 17, 1875	July 26
STEINER, FREDERICK, U.S. senator	Oct. 13, 1883	Feb. 3
STENGEL, DR. ALFRED, U.S. physician and educator	Nov. 3, 1868	Apr. 10
STEVENSON, REV. JOSEPH ROSS, U.S. minister and educator	Mar. 1, 1866	Aug. 13
STOCKARD, DR. CHARLES RUPERT, U.S. biologist	Feb. 27, 1879	Apr. 7
SUPER, CHARLES WILLIAM, U.S. educator	Sept. 12, 1842	Oct. 9
SWANSON, CLAUDE AUGUSTUS, U.S. secretary of navy	Mar. 31, 1862	July 7
TANNERY, JEAN, French financier	Dec. 31, 1878	July 7
TATSCH, JACOB HUGO, U.S. Masonic leader	Jan. 29, 1888	July 17
TEMPERLEY, HAROLD WILLIAM VAZELLE, British historian	Apr. 20, 1879	July 11
TEMPLETON, FAY, U.S. actress	Dec. 25, 1865	Oct. 3
THOMASHEFSKY, BORES, U.S. Yiddish actor	May 12, 1868	July 9
THOMSON, SIR BASIL, British police commissioner	Apr. 21, 1861	Mar. 26
TODD, DAVID, U.S. astronomer	Mar. 19, 1855	June 1
TOLLER, ERNST, German poet	Dec. 1, 1893	May 22
VALDEMAR, prince of Denmark	Oct. 27, 1858	Jan. 14
VAN DINE, S. S. (WILLARD HUNTINGTON WRIGHT), U.S. author	1888	Apr. 11
WALSH, FRANK PATRICK, U.S. attorney	July 20, 1864	May 2
WEBER, REV. HERMAN CARL, U.S. clergyman and editor	Feb. 9, 1873	July 25
WESTERMARCK, EDWARD ALEXANDER, Finnish sociologist and anthropologist	Nov. 20, 1862	Sept. 3
WILD, FRANK, British explorer	1874	Aug. 20
WILSON, CLARENCE TRUE, U.S. reformer	Apr. 24, 1872	Feb. 16
WILSON, HARRY LEON, U.S. author	May 1, 1867	June 28
WOOD, HENRY ALEXANDER WISE, U.S. inventor and manufacturer	Mar. 1, 1866	Apr. 9
WOODS, DR. FREDERICK ADAMS, U.S. biologist	Jan. 29, 1873	Nov. 5
WU PEI-FU, Chinese soldier and poet	1873	Dec. 4
YEATS, WILLIAM BUTLER, Irish poet	June 13, 1865	Jan. 28
ZEMGALS, GUSTAV, Latvian statesman	Aug. 12, 1871	Jan. 7

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ABERCROMBIE, JOHN WILLIAM, U.S. educator	May 17, 1866	July 2
ADAMS, THOMAS, British town planning expert	Sept. 10, 1871	Mar. 24
ADLER, CYRUS, U.S. educator	Sept. 13, 1863	Apr. 7
ALSBERG, CARL LUCAS, U.S. biochemist	Apr. 2, 1877	Oct. 31
ALSCHULER, ALFRED S., U.S. architect	Nov. 2, 1876	Nov. 6

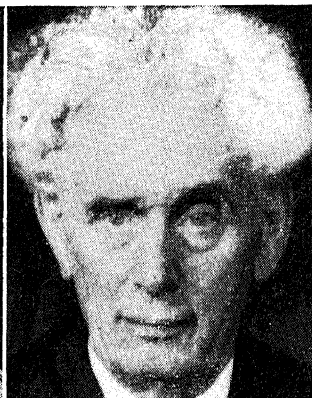
Name	Birth date	Death date	Name	Birth date	Death date
ANDERSON, MARY (MME. A. F. DE NAVARRO), U.S. actress	July 28, 1859	May 29	COOLIDGE, DANE, U.S. naturalist and novelist	Mar. 24, 1873	Aug. 8
ANDREWS, REV. CHARLES FREER, British missionary	Feb. 12, 1871	Apr. 4	COOPER, COURTNEY RYLEY, U.S. author	Oct. 31, 1886	Sept. 29
ARCO, COUNT GEORG WILHELM ALEXANDER HANS VON, German radio engineer	Aug. 30, 1869	May 7	CORDIER, CONSTANT, U.S. army officer	May 31, 1880	Feb. 24
ARSONVAL, DR. JACQUES ARSENE D', French physician	June 8, 1851	Dec. (?)	CORTELYOU, GEORGE BRUCE, U.S. statesman and industrialist	July 26, 1862	Oct. 23
ASHBROOK, WILLIAM ALBERT, U.S. congressman	July 1, 1867	Jan. 1	CRAIGAVON, JAMES CRAIG, 1ST VISCOUNT, Irish statesman	Jan. 8, 1871	Nov. 24
AZANA Y DIEZ, MANUEL, ex-president of Spain	Jan. 10, 1880	Nov. 4	CRAMER, STUART WARREN, U.S. manufacturer	Mar. 31, 1868	July 2
BAILEY, SIR ABE, South African promoter	Nov. 6, 1864	Aug. 10	CRAVATH, PAUL DRENNAN, U.S. lawyer	July 14, 1861	July 1
BALBO, ITALO, Italian statesman and aviator	June 6, 1896	June 28	CRAWSHAW, WILLIAM HENRY, U.S. educator	Nov. 6, 1861	July 2
BANKHEAD, WILLIAM BROCKMAN, U.S. statesman	Apr. 12, 1874	Sept. 15	DANIELS, ARTHUR HILL, U.S. educator	Oct. 19, 1865	Apr. 2
BARNES, GEORGE NICOLL, Scotch labour leader	Jan. 2, 1859	Apr. 22	DAUDET, JULIE ALLARD, French author	1847	Apr. 23
BARRERE, CAMILLE, French diplomat	Oct. 1851	Oct. 8	DAVIES, WILLIAM HENRY, British poet	Apr. 20, 1871	Sept. 26
BECKHAM, JOHN CREPPS WICKLIFFE, U.S. senator and governor	Aug. 5, 1869	Jan. 9	DAWES, RUFUS CUTLER, U.S. financier	July 30, 1867	Jan. 8
BEDFORD, DUKE OF (HERBRAND ARTHUR RUSSELL)	Feb. 19, 1858	Aug. 27	DENEEN, CHARLES SAMUEL, U.S. senator	May 4, 1863	Feb. 5
BEER, THOMAS, U.S. author	Nov. 22, 1889	Apr. 18	DE SCHWEINITZ, PAUL, U.S. Moravian bishop	Mar. 16, 1863	Feb. 8
BENSON, EDWARD FREDERIC, British author	July 24, 1867	Feb. 29	DODD, WILLIAM EDWARD, U.S. professor and ambassador	Oct. 21, 1869	Feb. 9
BEST, SIR MATTHEW ROBERT, British admiral	June 18, 1878	Oct. 13	DOERPFFELD, WILHELM, German archaeologist	Dec. 26, 1853	Apr. 26
BESTEIRO, JULIAN, Spanish statesman	1870	Sept. 27	DOLMETSCH, ARNOLD, French musician	Feb. 24, 1858	Apr. 29
BIELSCHOWSKY, ALFRED, German ophthalmologist	Dec. 11, 1871	Jan. 5	EDEY, BIRDSALL OTIS, U.S. Girl Scout leader	June 25, 1872	Mar. 17
BLOOD, SIR BINDON, British army officer	Nov. 7, 1842	May 16	EISEN, GUSTAVUS AUGUSTUS, Swedish-U.S. scientist	Aug. 2, 1847	Oct. 29
BLUMER, DR. GEORGE ALDER, U.S. psychiatrist	May 25, 1857	Apr. 25	ELLERMAN, FERDINAND, U.S. astronomer	May 13, 1869	Mar. 20
BONCI, ALESSANDRO, Italian tenor	1870	Aug. 10	ELLIOTT, MAXINE, U.S. actress	Feb. 5, 1871	Mar. 5
BOOTH, BALLINGTON, British-U.S. religious leader	July 28, 1859	Oct. 5	ESTIGARRIBIA, JOSE FELIX, president of Paraguay	Jan. 21, 1888	Sept. 7
BORAH, WILLIAM EDGAR, U.S. senator	June 29, 1865	Jan. 19	EYDE, SAMUEL, Norwegian chemist	Oct. 29, 1866	June (?)
BOSCH, CARL, German chemist	Aug. 27, 1874	Apr. 26	FAVERSHAM, WILLIAM, British-U.S. actor	Feb. 12, 1868	Apr. 7
BOSTWICK, LUCIUS ALLYN, U.S. naval officer	Feb. 1, 1869	Jan. 14	FEW, WILLIAM PRESTON, U.S. educator	Dec. 29, 1867	Oct. 16
BOURBON, JEAN PIERRE CLEMENT MARIE DE, (DUKE OF GUISE)	Sept. 4, 1874	Aug. 26	FINLEY, JOHN HUSTON, U.S. educator and editor	Oct. 19, 1863	Mar. 7
BOURNE, JONATHAN, JR., U.S. legislator	Feb. 23, 1855	Sept. 2	FISHER, HERBERT ALBERT LAURENS, British historian	Mar. 21, 1865	Apr. 17
BOWER, BERTHA MUZZY, U.S. author	Nov. 15, 1871	July 28	FISHER, JOHN STUCHELL, U. S. state governor	May 25, 1867	June 25
BRANLY, DESIRE EDOUARD EUGENE, French physicist	Oct. 23, 1844	Mar. 24	FITZGERALD, FRANCIS SCOTT KEY, U.S. author	Sept. 24, 1896	Dec. 21
BRUSH, MATTHEW CHAUNCEY, U.S. corporation official	1887	Oct. 15	FRANK, GLENN, U.S. educator and publicist	Oct. 1, 1887	Sept. 15
BUNAU-VARILLA, PHILIPPE, French engineer	July 25, 1859	May 18	FRIEDRICH KARL, Landgrave of Hesse, Germany	May 1, 1868	May 29
BUNDY, OMAR, U.S. army officer	June 17, 1861	Jan. 21	FROHMAN, DANIEL, U.S. theatrical manager	Aug. 22, 1851	Dec. 26
BUTLER, SMEDLEY DARLINGTON, U.S. marine corps officer	July 30, 1881	June 21	GARLAND, (HANNIBAL) HAMLIN, U.S. author	Sept. 14, 1860	Mar. 4
BUTTE, GEORGE CHARLES, U.S. lawyer	May 9, 1877	Jan. 18	GATTI-CASAZZA, GIULIO, Italian operatic director	Feb. 3, 1869	Sept. 2
BYRNE, REV. EDWARD J., Irish Catholic primate	1872	Feb. 9	GIBBS, GEORGE, U.S. consulting engineer	Apr. 19, 1861	May 19
CALLAHAN, PATRICK HENRY, U.S. industrialist	Oct. 15, 1866	Feb. 4	GIBSON, ERNEST WILLARD, U.S. senator	Dec. 29, 1871	June 20
CAMPBELL, BEATRICE STELLA, British actress	Feb. 9, 1865	Apr. 9	GILL, ERIC ROWLAND, British sculptor	Feb. 22, 1882	Nov. 17
CANTU, GIUSEPPE, Italian naval officer	May 24, 1873	Oct. 24	GLIMOUR, SIR JOHN, British statesman	May 27, 1876	Mar. 30
CARSON, JOHN RENSHAW, U.S. research engineer	June 28, 1887	Oct. 31	GLENN, MARY WILLCOX, U.S. welfare worker	Dec. 14, 1869	Nov. 3
CHAMBERLAIN, ARTHUR NEVILLE, British statesman	Mar. 18, 1869	Nov. 9	GOLDMAN, EMMA, international anarchist	June 27, 1869	May 14
CHRISTOPHER, Prince of Greece	July 29, 1888	Jan. 21	GOMA Y TOMAS, ISIDRO, Spanish cardinal	Aug. 17, 1869	Aug. 22
CHRYSLER, WALTER PERCY, U.S. industrialist	Apr. 2, 1875	Aug. 18	GOODRICH, JAMES PUTNAM, U.S. state governor	Feb. 18, 1864	Aug. 15
CLARKE, MARGUERITE, U.S. actress	Feb. 22, 1887	Sept. 25	GRAVES, WILLIAM SYDNEY, U.S. army officer	Mar. 27, 1865	Feb. 27
COLLINS, EDWARD DAY, U.S. educator	Dec. 17, 1869	Jan. 1	GRENFELL, SIR WILFRED THOMASON, British medical missionary	Feb. 28, 1865	Oct. 9
COOK, FREDERICK ALBERT, U.S. explorer	June 10, 1865	Aug. 5	GUILLAUMAT, MARIE LOUIS ADOLPHE, French soldier	Jan. 4, 1863	May 18

Pope Pius XI (1857-1939); William B. Bankhead (1874-1940); Smedley D. Butler (1881-1940); Arthur Neville Chamberlain (1869-1940)



Name	Birth date	Death date
HADFIELD, SIR ROBERT ABBOTT, British metallurgist	Nov. 29, 1858	Sept. 30
HAGGARD, DR. WILLIAM DAVID, U.S. surgeon	Sept. 28, 1872	Jan. 28
HAGNER, DR. FRANCIS RANDALL, U.S. genito-urinary surgeon	Feb. 19, 1873	July 7
HAINISCH, MICHAEL, ex-president of the Austrian republic	Aug. 15, 1858	Feb. 29
HANSON, OLE, U.S. real estate operator	Jan. 6, 1874	July 6
HARINGTON, SIR CHARLES HARINGTON, British army officer	May 31, 1872	Oct. 22
HARKNESS, EDWARD STEPHEN, U.S. philanthropist	Jan. 22, 1874	Jan. 29
HARRINGTON, FRANCIS CLARK, U.S. administrator of WPA	Sept. 10, 1887	Sept. 30
HEAD, SIR HENRY, British neurologist	Aug. 4, 1861	Oct. 9
HEIDENSTAM, CARL GUSTAF VERNER VON, Swedish author	July 6, 1859	May 20
HERING, HERMANN S., U.S. Christian Scientist lecturer	Aug. 24, 1864	May 15
HEYWARD, DU BOSE, U.S. author	Aug. 31, 1885	June 16
HILL, DR. EBEN CLAYTON, U.S. roentgenologist	Oct. 9, 1882	June 15
HOLLANDER, JACOB H., U.S. economist	July 23, 1871	July 9
HOOPER, FRANKLIN HENRY, U.S. editor	Jan. 28, 1862	Aug. 14
HORNE, ROBERT STEVENSON HORNE, 1st Viscount, British statesman	Feb. 28, 1871	Sept. 3
HORNER, HENRY, U.S. state governor	Nov. 30, 1878	Oct. 6
HOUSTON, DAVID FRANKLIN, U.S. economist and statesman	Feb. 17, 1866	Sept. 2
HOWE, FREDERIC CLEMSON, U.S. lawyer	Nov. 21, 1867	Aug. 3
HUTTON, MAURICE, Canadian educator	1856	Apr. 5
JABOTINSKY, VLADIMIR, Russian Zionist	1880	Aug. 3
KALLIO, KJOSTI, ex-president of Finland	1873	Dec. 19
KANTOROWICZ, HERMANN, exiled German scholar	Nov. 18, 1877	Feb. 12
KNOPE, DR. S. ADOLPHUS, U.S. physician	Nov. 27, 1857	July 15
KOHLER, WALTER JODOK, U.S. industrialist	Mar. 3, 1875	Apr. 21
KUBELIK, JAN, Bohemian violinist	1880	Dec. 5
LAGERLOF, SELMA, Swedish novelist	Nov. 20, 1858	Mar. 16
LAIDLAW, SIR PATRICK PLAYFAIR, British pathologist	Sept. 26, 1881	Mar. 20
LANSBURY, GEORGE, British labour leader	Feb. 21, 1859	May 7
LAVEDAN, HENRI LEON EMILE, French dramatist	1859	Aug. (?)
LEVENE, PHOEBUS AARON (THEODORE), U.S. biochemist	Feb. 25, 1869	Sept. 6
LEWIS, FRANCIS PARK, U.S. ophthalmologist	May 19, 1855	Sept. 10
LIE, JONAS, U.S. artist	Apr. 29, 1880	Jan. 10
LINDLEY, ERNEST HIRAM, U.S. educator	Oct. 2, 1869	Aug. 21
LIPPINCOTT, JOSHUA BERTRAM, U.S. publisher	Aug. 24, 1857	Jan. 19
LODGE, SIR OLIVER (JOSEPH), British scientist	June 12, 1851	Aug. 22
LOREE, LEONOR FRESNEL, U.S. railroad president	Apr. 23, 1858	Sept. 6
LOTHIAN, PHILIP HENRY KERR, 11th Marquess of, British diplomat	Apr. 18, 1882	Dec. 12
LUNDEEN, ERNEST, U.S. senator	1878	Aug. 31
MACBRIDE, ERNEST WILLIAM, British biologist	Dec. 12, 1866	Nov. 19
McCLELLAN, GEORGE BRINTON, U.S. publicist	Nov. 23, 1865	Nov. 30
McCORMICK, REV. WILLIAM PATRICK GLYN, British royal chaplain	June 14, 1877	Oct. 16
McGARRAH, GATES W., U.S. banker	1863	Nov. 5
McRAE, JAMES HENRY, U.S. army officer	Dec. 24, 1863	May 1
MANLY, JOHN MATTHEWS, U.S. educator	Sept. 2, 1865	Apr. 2
MARCHESI, BLANCHE (BARONNE CACAMISI), Italo-German opera singer	Apr. 4, 1863	Dec. 15
MARGOLIOUTH, DAVID SAMUEL, British Arabic scholar	Oct. 17, 1858	Mar. 23
MARKHAM, EDWIN, U.S. poet and lecturer	Apr. 23, 1852	Mar. 7
MARLER, SIR HERBERT MEREDITH, Canadian diplomat	Mar. 7, 1876	Jan. 31
MATTHEWS, REV. MARK ALLISON, U.S. clergyman	Sept. 24, 1867	Feb. 5
MAYO, KATHERINE, U.S. author	1867?	Oct. 9
MICHELIN, EDOUARD, French manufacturer	1859	Aug. 25
MIX, TOM, U.S. motion picture actor	Jan. 6, 1880	Oct. 12
MODJESKI, RALPH, U.S. engineer	Jan. 27, 1861	June 26
MORROW, MRS. HONORE WILLISIE, U.S. author	1880	Apr. 12
MOTON, ROBERT RUSSA, U.S. Negro educator	Aug. 26, 1867	May 31
MOTTA, GIUSEPPE, Swiss scholar and statesman	Dec. 29, 1871	Jan. 23
MUCK, KARL, German musician	Oct. 22, 1859	Mar. 4
MURRAY, AUGUSTUS TABER, U.S. professor	Oct. 29, 1866	Mar. 8
MYERS, JEROME, U.S. artist	Mar. 20, 1867	June 19
MYSCORE, MAHARAJAH OF, SRI KRISHNARAJAH WADIYAR BAHADUR, Indian ruler	June 4, 1884	Aug. 3
NAGEL, CHARLES, U.S. lawyer	Aug. 9, 1849	Jan. 5

Name	Birth date	Death date
NEWTON, ALFRED EDWARD, U.S. manufacturer and author	Aug. 26, 1863	Sept. 29
NIXON, LEWIS, U.S. shipbuilder	Apr. 7, 1861	Sept. 23
NOBLE, GLADWYN KINGSLEY, U.S. herpetologist	Sept. 20, 1894	Dec. 9
NORRIS, JAMES FLACK, U.S. chemist	Jan. 20, 1871	Aug. 3
NORTHROP, EDWIN FITCH, U.S. engineer	Feb. 23, 1866	Apr. 29
OWENS, ROBERT BOWIE, U.S. electrical engineer	Oct. 29, 1870	Nov. 1
PASTERNAK, JOSEF ALEXANDER, Polish-U.S. musician	1880	Apr. 29
PATRICK, MARY MILLS, U.S. leader in women's education in the near east	Mar. 10, 1850	Feb. 25
PEARL, DR. RAYMOND, U.S. biologist	June 3, 1879	Nov. 17
PEIXOTTO, ERNEST CLIFFORD, U.S. artist	Oct. 15, 1869	Dec. 6
PERKINS, JAMES HANDASYD, U.S. banker	Jan. 11, 1876	July 12
PIERCE, PALMER EDDY, U.S. army officer	Oct. 23, 1865	Jan. 17
PITTMAN, KEY, U.S. senator	Sept. 19, 1872	Nov. 10
POORE, BENJAMIN ANDREW, U.S. army officer	June 22, 1863	Aug. 27
PUSEY, DR. WILLIAM ALLEN, U.S. dermatologist	Dec. 1, 1865	Aug. 29
RAUTENBURG, ROBERT, U.S. ecclesiastical sculptor	1857	Feb. 21
REYNOLDS, GEORGE McCLELLAND, U.S. banker	Jan. 15, 1865	Feb. 26
RIESMAN, DR. DAVID, U.S. physician	Mar. 25, 1867	June 3
RODMAN, HUGH, U.S. naval officer	Jan. 6, 1859	June 7
ROGERS, NORMAN McLEOD, Canadian statesman	July 25, 1894	June 10
ROSNY, JOSEPH HENRY (JOSEPH BOEX), French novelist	1856	Feb. 14
ROSTRON, SIR ARTHUR HENRY, British sea captain	May 14, 1869	Nov. 4
ROTHERMERE, HAROLD SIDNEY HARMSWORTH, 1st Viscount, British publisher	Apr. 26, 1868	Nov. 26
SABRY PASHA, HASSAN, Egyptian premier	1879	Nov. 14
SAIONJI, PRINCE KIMMOCHI, Japanese statesman	1849	Nov. 24
SANDEFER, JEFFERSON DAVIS, U.S. educator	Mar. 13, 1868	Mar. 22
SARGENT, FRED WESLEY, U.S. railroad executive	May 26, 1876	Feb. 4
SAVAGE, MICHAEL JOSEPH, prime minister of New Zealand	Mar. 7, 1872	Mar. 26
SCHERESCHEWSKY, DR. JOSEPH WILLIAMS, U.S. cancer expert	Mar. 6, 1873	July 9
SCUDDER, JANET, U.S. sculptor and painter	Oct. 27, 1873	June 9
SHANKS, DAVID CAREY, U.S. army officer	Apr. 6, 1861	Apr. 10
SIMMONS, FURNIFOLD McLENDILL, U.S. attorney and legislator	Jan. 20, 1854	Apr. 30
SINGER, DR. HAROLD DOUGLAS, U.S. alienist	Jan. 7, 1875	Aug. 29
SQUIRES, SIR RICHARD ANDERSON, ex-prime minister of Newfoundland	Jan. 18, 1880	Mar. 26
STEWART, REV. GEORGE CRAIG, U.S. Protestant Episcopal bishop	Aug. 18, 1879	May 2
TAINTER, CHARLES SUMNER, U.S. inventor	Apr. 25, 1854	Apr. 20
TAUSSIG, FRANK WILLIAM, U.S. economist	Dec. 28, 1859	Nov. 11
TAYLOR, DAVID WATSON, U.S. naval officer	Mar. 4, 1864	July 28
TETRAZZINI, LUISA, Italian singer	June 29, 1871	Apr. 28
THAYER, ERNEST LAWRENCE, U.S. journalist	Aug. 14, 1863	Aug. 21
THOMSON, SIR JOSEPH JOHN, British physicist	Dec. 18, 1856	Aug. 30
TOKUGAWA, PRINCE IYESATO, Japanese statesman	July 11, 1863	June 4
TOVEY, SIR DONALD FRANCIS, British composer	July 17, 1875	July 10
TROTHA, ADOLF LEBRECHT VON, German naval officer	Mar. 1, 1868	Oct. 11
TROTSKY, LEON, Russian politician	1879	Aug. 21
TUCIC, SERGE DE, Croatian playwright	1873	Sept. 25
TURPIN, BEN, U.S. comedian	1869	July 1
TWEEDSMUIR, 1st BARON (JOHN BUCHAN), governor general of Canada	Aug. 26, 1875	Feb. 11
UNTERMYER, SAMUEL, U.S. lawyer	Mar. 2, 1858	Mar. 16
UNWIN, SIR RAYMOND, British town planner	Nov. 2, 1863	June 28
VERDIER, JEAN, French cardinal	Feb. 1864	Apr. 9
VUILLARD, JEAN EDOUARD, French artist	1868	June 21
WAGNER-JUAREGG, JULIUS, Austrian physician	Mar. 7, 1857	Oct. 1
WALD, LILLIAN D., U.S. sociologist	Mar. 10, 1867	Sept. 1
WATROUS, HARRY WILLSON, U.S. artist	Sept. 17, 1857	May 10
WAUGH, FREDERICK JUDD, U.S. artist	Sept. 13, 1861	Sept. 10
WILD, HORACE B., U.S. airman	1879?	July 23
WILLS, C. HAROLD, U.S. engineer	1878	Dec. 30
WOLFE, HUMBERT, British poet	Jan. 5, 1885	Jan. 5
WOOD, SPENCER SHEPARD, U.S. naval officer	Aug. 7, 1861	July 30
YELLIN, SAMUEL, U.S. metalworker	Mar. 2, 1885	Oct. 3
ZIMMERMANN, ARTHUR, German diplomat	May 8, 1859	June 6



Leon Trotsky (1879-1940); Alphonso XIII (1886-1941); Louis Brandeis (1856-1941); Lou Gehrig (1903-1941)

Name	Birth date	Death date
ZINSSER, DR. HANS, U.S. bacteriologist . . .	Nov. 17, 1878	Sept. 4

1941

ADLER, GUIDO, Austrian writer and professor of music	Nov. 1, 1855	Feb. (?)
AGUIRRE CERDA, PEDRO, Chilean statesman	Feb. 6, 1879	Nov. 25
ALBERTINI, LUIGI, Italian journalist and politician	Oct. 19, 1871	Dec. 29?
ALEXANDER, ROBERT, U.S. army officer . . .	Oct. 17, 1863	Aug. 26
ALPHONSO XIII, king of Spain . . .	May 17, 1886	Feb. 28
ANDERSON, SHERWOOD, U.S. author . . .	Sept. 13, 1876	Mar. 8
ARMOUR, ALLISON VINCENT, U.S. yachtsman and scientist	Mar. 18, 1863	Mar. 6
ARNAULD DE LA PERIERE, LOTHAR VON, German vice-admiral . . .	Mar. 18, 1886	Feb. 24
AUSTIN, FREDERICK BRITTEN, British author and playwright . . .	May 8, 1885	Mar. 12
AUSTIN, HERBERT AUSTIN, 1ST BARON, British motorcar manufacturer . . .	Nov. 8, 1866	May 23
BADEN-POWELL, ROBERT STEPHENSON SMYTH BADEN-POWELL, 1ST BARON, British founder of Boy Scout movement . . .	Feb. 22, 1857	Jan. 8
BAER, WILLIAM JACOB, U.S. painter . . .	Jan. 29, 1860	Sept. 21
BAGBY, ALBERT MORRIS, U.S. pianist and manager of musical artists . . .	Apr. 29, 1859	Feb. 26
BANTING, SIR FREDERICK GRANT, Canadian medical scientist . . .	Nov. 14, 1891	Feb. 21
BARGLAY, SIR THOMAS, British lawyer . . .	1853	Jan. (?)
BARTET (REGNAULT), JEANNE JULIA, French actress . . .	Oct. 28, 1854	Nov. (?)
BEARD, DANIEL CARTER, U.S. founder of the Boy Scout movement in the United States . . .	June 21, 1850	June 11
BELL, ALEXANDER, British chief of Scotland Yard . . .	1887?	July 5
BERENSCHOT, GERARDUS JOHANNES, Dutch commander of Netherlands Indies army . . .	July 24, 1887	Oct. 13
BERG, ERNST JULIUS, U.S. electrophysicist . . .	Jan. 9, 1871	Sept. 9
BERGSON, HENRI, French philosopher . . .	Oct. 18, 1859	Jan. 4
BERTRAND, LOUIS, French novelist, historian and academician . . .	Mar. 20, 1866	Dec. 6
BIBESCO, PRINCE GEORGES VALENTIN, Rumanian aviation pioneer . . .	Apr. 23, 1880	July 3?
BIRDSEYE, CLAUDE HALE, U.S. topographic engineer . . .	Feb. 13, 1878	May 30
BLACKTON, JAMES STUART, U.S. pioneer film producer . . .	Jan. 5, 1875	Aug. 13
BLOCK, PAUL, U.S. newspaper publisher . . .	Nov. 2, 1877	June 22
BLUMENTHAL, GEORGE, U.S. banker and art collector . . .	Apr. 7, 1858	June 26
BOIS, ELIE-JOSEPH, French newspaper editor . . .	Feb. 2, 1878	Apr. 27
BONINE, FRED N., U.S. eye specialist . . .	Oct. 21, 1863	Aug. 22
BORGLUM, (JOHN) GUTZON (DE LA MOTHE), U.S. sculptor . . .	Mar. 25, 1871	Mar. 6
BOTANA, NATALIO, Argentinian publisher . . .	1888	Aug. 7
BRANDEIS, LOUIS DEMBITZ, U.S. jurist . . .	Nov. 13, 1856	Oct. 5
BRIDGES, ROBERT ("DROCH"), U.S. editor and author . . .	July 13, 1858	Sept. 2
BROWN, CARLETON FAIRCHILD, U.S. educator . . .	July 15, 1869	June 25
BROWNE, DAME SIDNEY JANE, British nurse . . .	Jan. 5, 1850	Aug. 13
BRUSH, GEORGE DE FOREST, U.S. painter . . .	Sept. 28, 1855	Apr. 24
BURDWAN, SIR BIJAY CHAND MAHTAB, MAHARAJADHIRAJA BAHADUR OF, Indian statesman . . .	Oct. 19, 1881	Aug. 29
BUSH, WENDELL T., U.S. educator . . .	Sept. 25, 1866	Feb. 10
BYRAM, HARRY E., U.S. rail executive . . .	Nov. 28, 1865	Nov. 11
CAMPINCHI, CESAR, French statesman . . .	May 4, 1882	Feb. 23
CANDLER, WARREN AKIN, U.S. Methodist bishop . . .	Aug. 23, 1857	Sept. 25
CANNON, ANNIE JUMP, U.S. astronomer . . .	Dec. 11, 1863	Apr. 13

Name	Birth date	Death date
CAPERTON, WILLIAM BANKS, U.S. naval officer . . .	June 30, 1855	Dec. 21
CHAFFEE, ADNA ROMANZA, U.S. army officer . . .	Sept. 23, 1884	Aug. 22
CHEVROLET, LOUIS, U.S. motorcar designer, racer and inventor . . .	(?)	June 6
CHRISTIE, LORING C., Canadian minister to U.S. . . .	(?)	Apr. 8
CLAUSSEN, JULIA, Swedish opera singer . . .	June 11, 1879	May 1
CLAY, LAURA, U.S. suffragist . . .	Feb. 9, 1849	June 29
CLIFFORD, SIR HUGH, British colonial administrator . . .	Mar. 5, 1866	Dec. 19
CONRAD, FRANK, U.S. engineer and radio expert . . .	May 4, 1874	Dec. 11
COUCH, HARVEY CROWLEY, U.S. utilities executive . . .	Aug. 21, 1877	July 30
CSÁKY, COUNT STEPHEN, Hungarian diplomat . . .	1897	Jan. 27
CUDAHY, EDWARD ALOYSIUS, SR., U.S. meat packer . . .	Feb. 1, 1860	Oct. 18
D'ABERNON, EDGAR VINCENT, 1ST VIS-COUNT, British diplomat . . .	Aug. 19, 1857	Nov. 1
DAUGHERTY, HARRY MICAJAH, U.S. politician . . .	Jan. 26, 1860	Oct. 12
DAVENPORT, EUGENE, U.S. agriculturist . . .	June 20, 1856	Mar. 31
DAVIES, SIR HENRY WALFORD, British organist and composer . . .	Sept. 6, 1869	Mar. 11
DAVIS, WILLIAM RHODES, U.S. oil executive . . .	Feb. 10, 1889	Aug. 1
DEVANEY, JOHN PATRICK, U.S. judge . . .	June 30, 1883	Sept. 21
DINSMORE, CHARLES ALLEN, U.S. educator and clergyman . . .	Aug. 4, 1860	Aug. 14
DORMOY, MARX, French socialist leader . . .	1889?	July 26
DRIESCH, HANS ADOLF EDUARD, German biologist and philosopher . . .	Oct. 28, 1867	Apr. (?)
DUBOIS, EUGENE, Dutch physician and geologist . . .	1858	Feb. (?)
EDWARDS, AGUSTIN, Chilean statesman . . .	June 17, 1878	June 18
EIDMANN, FRANK LEWIS, U.S. educator . . .	Dec. 20, 1887	Sept. 4
ELLIS, CARLETON, U.S. research chemist and inventor . . .	Sept. 20, 1876	Jan. 13
ELTINGE, JULIAN, U.S. actor . . .	May 14, 1883	Mar. 7
EVANS, SIR ARTHUR JOHN, British archaeologist . . .	July 8, 1851	July 11
EVES, REGINALD GRENVILLE, British portrait painter . . .	1876	June 14
FEDER, GOTTFRIED, German statesman . . .	Jan. 27, 1883	Sept. 24
FIELDS, LEW (LEWIS MAURICE FIELDS), U.S. comedian . . .	Jan. 1, 1867	July 20
FINGER, CHARLES JOSEPH, U.S. author and editor . . .	Dec. 25, 1869	Jan. 7
FISHER, CLARENCE STANLEY, U.S. archaeologist . . .	Aug. 17, 1876	July 20
FISHER, FREDERIC JOHN, U.S. manufacturer of automobile bodies . . .	Jan. 2, 1878	July 14
FOUGNER, G. SELMER, U.S. newspaperman . . .	Aug. 24, 1884	Apr. 2
FRAZER, SIR JAMES GEORGE, British anthropologist . . .	Jan. 1, 1854	May 7
FREW, WALTER EDWIN, U.S. banker and financier . . .	July 18, 1864	May 19
GEHRIG, HENRY LOUIS, U.S. baseball star . . .	June 19, 1903	June 2
GRANGER, WALTER, U.S. explorer and paleontologist . . .	Nov. 7, 1872	Sept. 7
GRASER, EARLE W. ("LONE RANGER"), U.S. radio actor . . .	(?)	Apr. 8
GRAUBERT, ULRICH, German col. gen., air force commander . . .	(?)	May (?)
GRIFFITH, JOHN PRICE CROZER, U.S. pediatrician . . .	Jan. 5, 1856	July 28

Name	Birth date	Death date
GRINDELL-MATTHEWS, HARRY, British scientist and inventor	Mar. 17, 1880	Sept. 11
GUERTNER, FRANZ, German jurist and politician	Aug. 26, 1881	Jan. 28
GUGGENHEIM, SIMON, U.S. financier	Dec. 30, 1867	Nov. 2
GUNTHER, FRANKLIN MOTT, U.S. diplomat	Feb. 28, 1885	Dec. 22
HACKETT, HORATIO BALCH, U.S. architect	May 8, 1880	Sept. 8
HALL, GROVER CLEVELAND, U.S. editor	Jan. 11, 1888	Jan. 9
HARRIS, JAMES RENDEL, British scholar	1852	Mar. 1
HARRIS, SAM H., U.S. theatrical producer	Feb. 3, 1872	July 3
HARRISON, BYRON PATTON, U.S. senator	Aug. 29, 1881	June 22
HARTY, SIR HERBERT HAMILTON, Irish composer and conductor	Dec. 4, 1880	Feb. 19
HAWLEY, WILLIS CHATMAN, U.S. congressman	May 5, 1864	July 24
HAYES, SIR BERTRAM FOX, British sea captain	Apr. 25, 1864	May 15
HAZEN, CHARLES DOWNER, U.S. historian	Mar. 17, 1868	Sept. 18
HECKSCHER, AUGUST, U.S. philanthropist	Aug. 27, 1848	Apr. 26
HIGGINSON, MARY POTTER THACHER, U.S. poet and author	Nov. 26, 1844	Jan. 9
HILFERDING, RUDOLF, German statesman	Aug. 10, 1877	Sept. (?)
HILL, SIR ARTHUR WILLIAM, British botanist	Oct. 11, 1875	Nov. 3
HILL, ROBERT THOMAS, U.S. geologist	Aug. 11, 1858	July 28
HINTZE, PAUL VON, German admiral and diplomat	Feb. 13, 1864	Aug. 23
HOBART, ESTHER JANE TUTTLE, wife of U.S. Vice-President Hobart	Apr. 30, 1849	Jan. 8
HOBSON, ROBERT LOCKHART, British authority on porcelain and pottery	July 26, 1872	June 6
HOLLAND, CHARLES THURSTAN, British scientist and radiologist	(?)	Jan. 16
HOLT, SIR HERBERT SAMUEL, Canadian financier	Feb. 12, 1856	Sept. 28
HORGAN, STEPHEN HENRY, U.S. inventor of photoengraving processes	Feb. 2, 1854	Aug. 30
HOUGHTON, ALANSON BIGELOW, U.S. diplomat	Oct. 10, 1863	Sept. 16
HOVEY, OTIS ELLIS, U.S. civil engineer	Apr. 9, 1864	Apr. 15
HOXIE, CHARLES A., U.S. inventor	1867	Oct. 13
HUNTZIGER, CHARLES LÉON CLEMENT, French army officer	June 25, 1880	Nov. 12
HYMANS, PAUL, Belgian statesman	Mar. 23, 1865	Mar. 8
HYVERNAT, (EUGENE-XAVIER-LOUIS) HENRY, U.S. orientalist and educator	June 30, 1858	May 29
JAMES, ARTHUR CURTISS, U.S. railroad industrialist	June 1, 1867	June 4
JOHNSON, AMY, British aviatrix	1903	Jan. 5
JONES, HOWARD HARDING, U.S. football coach	Aug. 23, 1885	July 27]
JOYCE, JAMES, Irish author and poet	Feb. 2, 1882	Jan. 13
JUST, ERNEST EVERETT, U.S. zoologist	Aug. 14, 1883	Oct. 27
KASPAR, KAREL, Czech cardinal	May 16, 1870	Apr. 21
KELLY, COLIN P., JR., U.S. army flier	July 11, 1915	Dec. 10
KERL, HANNS, German minister of religious affairs	Dec. 11, 1887	Dec. 14?
KIDD, ISAAC CAMPBELL, U.S. naval officer	Mar. 26, 1884	Dec. 7
KITTREDGE, GEORGE LYMAN, U.S. educator	Feb. 28, 1860	July 23
KOFFKA, KURT, U.S. psychologist	Mar. 18, 1886	Nov. 22
KORIZIS, ALEXANDER, Greek banker and statesman	Apr. 15, 1885	Apr. 18
KOURKOULIS, METHODIOS, Greek church leader in U.S.	Oct. 26, 1862	Apr. 9
KRAUSE, ALLEN KRAMER, U.S. tuberculosis expert	Feb. 13, 1881	May 12
KRIVITSKY, WALTER G., former Russian army chief of intelligence	June 28, 1899	Feb. 10
LAFFOON, RUBY, U.S. politician	Jan. 15, 1869	Mar. 1
LAMBERTON, ROBERT ENEAS, mayor of Philadelphia, Pa.	Sept. 14, 1886	Aug. 22
LANGMUIR, ARTHUR COMINGS, U.S. research chemist	Feb. 7, 1872	May 14
LANMAN, CHARLES ROCKWELL, U.S. Sanskrit scholar	July 8, 1850	Feb. 20
LAPORTE, ERNEST, Canadian statesman	Oct. 6, 1876	Nov. 26
LASKER, EMANUEL, German chess player	Dec. 24, 1868	Jan. 11
LAUGHLIN, CLARA ELIZABETH, U.S. travel writer	Aug. 3, 1873	Mar. 3
LAUGHLIN, IRWIN BOYLE, U.S. ambassador	Apr. 26, 1871	Apr. 18
LAURI, LORENZO, Italian cardinal	Oct. 15, 1864	Oct. 8
LAVERY, SIR JOHN, British painter	Mar. 1856	Jan. 10
LAWRENCE, WILLIAM, U.S. Episcopal bishop	May 30, 1850	Nov. 6
LEBESGUE, HENRI, French mathematician	1875	Aug. 6?
LEBLANC, GEORGETTE, French singer and actress	1875	Oct. 28?
LEBLANC, MAURICE, French detective story writer	Dec. 11, 1864	Nov. 6
LEONARD, EDDIE (LEMUEL GORDON TONEY), U.S. minstrel and vaudeville star	Oct. 1875	July 29
LEVINSON, SALMON OLIVER, U.S. attorney	Dec. 29, 1865	Feb. 2
LEVITZKI, MISCHA, U.S. concert pianist and composer	May 25, 1898	Jan. 2
LEWIS, DEAN DE WITT, U.S. surgeon	Aug. 11, 1874	Oct. 9

Name	Birth date	Death date
LIVERPOOL, EARL OF (ARTHUR WILLIAM DE BRITO SAVILE FOLJAMBE), British peer and first governor general of New Zealand	May 27, 1870	May 16
LLEWELLYN, SIR WILLIAM, British artist	Dec. 1863	Jan. 28
LLOYD GEORGE, DAME MARGARET, wife of former British prime minister	1863?	Jan. 20
LLOYD OF DOLOBRAN, GEORGE AMBROSE LLOYD, 1ST BARON, British statesman	Sept. 19, 1879	Feb. 4
LOUDON, HUGO, Netherlands oil executive	1860?	Sept. 6
LO WEN-KAN, Chinese lawyer and politician	1888	Oct. 16
McADOO, WILLIAM GIBBS, U.S. lawyer and senator	Oct. 31, 1863	Feb. 1
Mc CORMICK, HAROLD FOWLER, U.S. industrialist	May 2, 1872	Oct. 16
McLEAN, EDWARD BEALE, U.S. publisher	1883	July 27
McNAMARA, JAMES B., U.S. labour agent	1881?	Mar. 8
MAHMUD, MOHAMMED PASHA, Egyptian politician	1882	Feb. 1
MALLORY, CLIFFORD D., U.S. shipping executive and yachtsman	May 26, 1881	Apr. 7
MALLORY, FRANK BURR, U.S. pathologist	Nov. 12, 1862	Sept. 27
MANN, TOM, British labour leader	Apr. 15, 1856	Mar. 13
MARCHAND, JEAN, French painter	Nov. 22, 1883	Oct. (?)
MARTIN, FRANK LEE, U.S. educator	July 7, 1881?	July 18
MASCHERONI, EDOARDO, Italian conductor and composer	Sept. 4, 1859	Mar. 4
MATHEWS, SHAILER, U.S. theologian and educator	May 26, 1863	Oct. 23
MENOCAL, MARIO GARCIA MENOCAL Y DEOP, Cuban statesman	Dec. 16, 1866	Sept. 7
MEREZHKOVSKY, DMITRI SERGIEVICH, Russian novelist and critic	Aug. 2, 1865	Dec. (?)
METAXAS, JOHN, Greek dictator and premier	Apr. 12, 1871	Jan. 29
MILLER, DAYTON C., U.S. physicist	Mar. 13, 1866	Feb. 22
MITCHELL, CHARLES HAMILTON, Canadian army officer and educator	Feb. 18, 1872	Aug. 26
MOCHIZUKI, KEISUKE, Japanese statesman	Mar. 1867	Jan. 1
MOELDERS, WERNER, German war pilot	1913?	Nov. 22
MONIVONG, SISOWATH, Indo-Chinese monarch	Dec. 27, 1875	Apr. 23
MORAN, (JOHN) LÉON, U.S. artist	Oct. 4, 1864	Aug. 4
MORGAN, HELEN, U.S. stage, screen and radio singer	1900?	Oct. 8
MOSCA, GAETANO, Italian scholar and political scientist	Apr. 1, 1858	Nov. 9
MOWAT, ROBERT BALMAIN, British historian	Sept. 26, 1883	Sept. 1
MUIR, JOHN RAMSAY BRYCE, British historian and parliamentarian	1872	May 4
MURPHY, J. HARVEY, U.S. clergyman	Apr. 28, 1882	Sept. 19
MURRAY, CHARLIE, U.S. motion picture comedian	July 22, 1872	July 29
MURRAY, SAMUEL, U.S. sculptor	June 1870	Nov. 3
MUSSOLINI, BRUNO, Italian aviator, son of Benito Mussolini	1918	Aug. 7
NAGAYO, MATAO, Japanese educator and bacteriologist	Apr. 1878	Aug. 16
NATALIE, queen of Serbia	May 2, 1859	May (?)
NERNST, WALTER, German physical chemist	June 25, 1864	Nov. 18
NEVINSON, HENRY WOODD, British war correspondent and author	1856	Nov. 9
NEWLON, JESSE HOMER, U.S. educator	July 16, 1882	Sept. 1
NOEL, CARLOS MARTIN, Argentine statesman and writer	Oct. 30, 1886	Jan. 3
NOYES, WILLIAM ALBERT, U.S. chemist	Nov. 6, 1857	Oct. 24
O'BRIEN, EDWARD JOSEPH HARRINGTON, U.S. author and editor	Dec. 10, 1890	Feb. 25
O'CONNOR, ANDREW, U.S. sculptor	June 7, 1874	June 11
OSUMI, BARON MINEO, Japanese naval officer and supreme war councillor	May 1876	Feb. (?)
OXENHAM, JOHN (WILLIAM ARTHUR DUNKERLEY), British author	(?)	Jan. 24
PADEREWSKI, IGNACE JAN, Polish pianist, composer and statesman	Nov. 6, 1860	June 29
PAPI, GENNARO, U.S.-Italian conductor	Dec. 1886	Nov. 29
PARKMOOR, CHARLES ALFRED CRIPPS, 1ST BARON, British lawyer and statesman	Oct. 3, 1852	June 30
PARR, SIR (CHRISTOPHER) JAMES, New Zealand statesman	May 18, 1869	May 2
PAXTON, WILLIAM MCGREGOR, U.S. artist	June 22, 1869	May 13
PENNER, JOE (JOSEPH PINTER) U.S. comedian	Nov. 11, 1904	Jan. 10
PHILLIPS, SIR TOM SPENCER VAUGHAN, British naval officer	1888?	Dec. 10
PORTER, EDWIN S., U.S. motion picture pioneer	1869?	Apr. 30
POWER, SIR D'ARCY, British surgeon	Nov. 11, 1855	May 18
PRAJADHIPOK, prince of Sukhodaya and king of Siam	Nov. 8, 1893	May 31

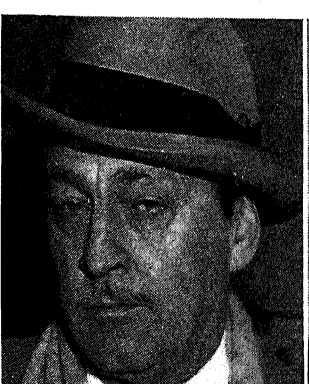
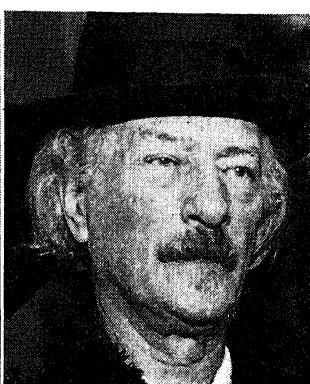
Name	Birth date	Death date
PRÉVOST, EUGÈNE MARCEL, French novelist	May 1, 1862	Apr. 8
PRIEN, GUENTHER, German submarine commander.	1908?	(?)
QUIDDE, LUDWIG, German pacifist and winner of 1927 Nobel peace prize.	Mar. 23, 1858	Mar. 4
RADZIWIŁŁ, PRINCESS CATHERINE (MRS. CHARLES LOUIS KOLB-DANVIN), U.S. writer and lecturer.	Mar. 30, 1858	May 11
RENNELL, 1ST BARON OF RODD (JAMES RENNEL RODD), British diplomat . . .	Nov. 9, 1858	July 27
RIBEIRO, MANOEL, Portuguese novelist . . .	1879?	Nov. (?)
RICKERT, THOMAS A., U.S. labour leader . .	Apr. 24, 1876	July 28
RIDDLE, JOHN WALLACE, U.S. diplomat . .	July 12, 1864	Dec. 8
RIDGE, LOLA (MRS. DAVID LAWSON), U.S. poetess	1884	May 19
RIPLEY, WILLIAM ZEBINA, U.S. economist .	Oct. 13, 1867	Aug. 16
ROBERTS, ELIZABETH MADOX, U.S. novelist	1886	Mar. 13
ROBINSON, FREDERICK BERTRAND, U.S. college president.	Oct. 16, 1883	Oct. 19
ROOSEVELT, GRACIE HALL, U.S. electrical engineer	June 28, 1891	Sept. 25
ROOSEVELT, SARA DELANO, mother of Franklin Delano Roosevelt	Sept. 21, 1854	Sept. 7
ROURKE, CONSTANCE MAYFIELD, U.S. writer	Nov. 14, 1885	Mar. 23
ROWELL, NEWTON WESLEY, Canadian politician and jurist . . .	Nov. 1, 1867	Nov. 22
RUBENS, HORATIO SEYMOUR, U.S. lawyer	June 6, 1869	Apr. 3
RUMBOLD, SIR HORACE GEORGE MONTAGU, British diplomat . . .	Feb. 5, 1869	May 24
RUSSELL, LADY MARY ANNETTE (pseudonym ELIZABETH), British author . . .	1866	Feb. 9
SABATIER, PAUL, French chemist	Nov. 5, 1854	Aug. 14
SACKETT, FREDERIC MOSELEY, U.S. ambassador and senator.	Dec. 17, 1868	May 18
SAKATANI, VISCOUNT YOSHIRO, Japanese financier	Jan. 16, 1863	Nov. 14
SANBORN, JOHN PITTS, U.S. newspaperman and music critic	1879	Mar. 7
SCHOBERT, EUGEN RITTER VON, German army officer	1883?	Sept. 12
SCHROEDER, LUDWIG VON, German army officer	Sept. 12, 1884	July 29
SCHULTE, KARL JOSEF, German cardinal . .	Sept. 14, 1871	Mar. 11
SHEPPARD, MORRIS, U.S. senator	May 28, 1875	Apr. 9
SIEMENS, CARL FRIEDRICH VON, German industrialist and munitions manufacturer .	Sept. 5, 1872	July 10
SMITH, PRESERVED, U.S. historian and professor.	July 22, 1880	May 15
SMOOT, REED, U.S. senator	Jan. 10, 1862	Feb. 9
SOMBART, WERNER, German economist . .	Jan. 19, 1863	May 19
STAMP, JOSIAH CHARLES STAMP, 1ST BARON, OF SHORTLANDS, British economist and banker	June 21, 1880	Apr. 16
STANG, FREDRIK, Norwegian statesman, educator and jurist	1867	Nov. 15
STILES, CHARLES WARDELL, U.S. medical zoologist	May 15, 1867	Jan. 24
STOLZ, JOSEPH, U.S. rabbi	Nov. 3, 1861	Feb. 7
STONEHAVEN, 1ST VISCOUNT OF URY (JOHN LAWRENCE BAIRD), British statesman	Apr. 27, 1874	Aug. 20
STUART, JAMES EVERETT, U.S. painter . .	Mar. 24, 1852	Jan. 1
SUFFOLK AND BERKSHIRE, EARL OF (CHARLES HENRY GEORGE HOWARD), British scientist	Mar. 2, 1906	May 12
TAGORE, SIR RABINDRANATH, Indian poet and author	May 6, 1861	Aug. 7

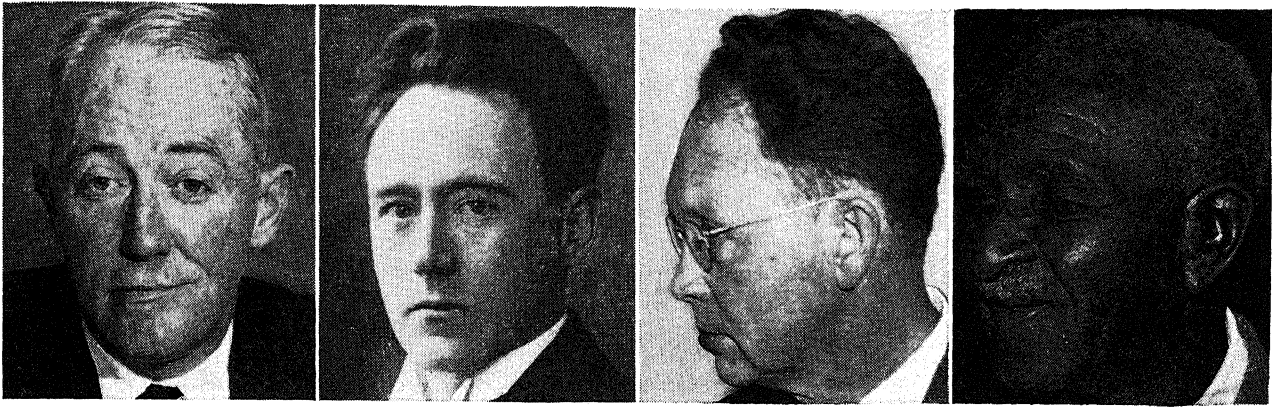
Name	Birth date	Death date
TASSIN, ALGERNON DE VIVIER, U.S. author and educator	Dec. 11, 1869	Nov. 3
TAYLOR, HENRY OSBORN, U.S. historian and philosopher	Dec. 5, 1856	Apr. 13
TELEKI, COUNT, PÁL, Hungarian statesman and geographer	Nov. 1, 1879	Apr. 3
THOMPSON, JAMES WESTFALL, U.S. historian	June 3, 1869	Sept. 30
THOMPSON, REGINALD CAMPBELL, British archaeologist and Assyriologist.	Aug. 21, 1876	May 24?
TITULESCU, NICOLAE, Rumanian diplomat.	1883	Mar. 17
UDET, ERNST, German aviator	Apr. 26, 1896	Nov. 17
UPDIKE, DANIEL BERKELEY, U.S. printer .	Feb. 24, 1860	Dec. 28
USSISHKIN, MENAHEM, Zionist leader . . .	Aug. 15, 1863	Oct. 2
VAN DEVANTER, WILLIS, U.S. associate justice, U.S. supreme court	Apr. 17, 1859	Feb. 8
VINCENT, GEORGE EDGAR, U.S. educator .	Mar. 21, 1864	Feb. 1
VINCENT, HENRY BETHUEL, U.S. composer	Dec. 28, 1872	Jan. 7
WAKEFIELD, CHARLES, CHEERS WAKEFIELD, 1ST VISCOUNT OF HYTHE, British philanthropist.	Dec. 1859	Jan. 15
WALPOLE, SIR HUGH SEYMOUR, British novelist.	1884	June 1
WATSON, JOHN CHRISTIAN, Australian politician.	Apr. 9, 1867	Nov. 18
WHORF, BENJAMIN LEE, U.S. anthropologist.	Apr. 24, 1897	July 26
WILCOX, SIR WILLIAM HENRY, British expert on poisons	Jan. 18, 1870	July 8
WILLIAM II, German emperor.	Jan. 27, 1859	June 4
WILLINGDON, MARQUESS OF (FREEMAN FREEMAN-THOMAS), British diplomat. . .	Sept. 12, 1866	Aug. 12
WOOLF, VIRGINIA, British novelist and essayist	1882	Mar. 28?
WREN, PERCIVAL CHRISTOPHER, British soldier and author	1885	Nov. 23
ZAHLE, HERLUF, Danish diplomat	Mar. 14, 1873	May 4

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AHMED II, SIDI, bey of Tunis.	1862	June 19
AINSWORTH, WILLIAM NEWMAN, U.S. Methodist bishop	Feb. 10, 1872	July 7
ALBEMARLE, ARNOLD ALLAN CECIL KEPPEL, 8TH EARL OF, British peer . . .	June 1, 1858	Apr. 11
ALLEN, GLOVER MORRILL, U.S. scientist .	Feb. 8, 1879	Feb. 14
ALVEAR, MARCELO TORCUATO DE, Argentine politician	Oct. 4, 1868	Mar. 23
AMULREE, WILLIAM WARRENDER MACKENZIE, 1ST BARON, British lawyer and labour arbitrator.	Aug. 19, 1860	May 5
ANNENBERG, MOSES (MOE) LOUIS, U.S. publisher	Feb. 11, 1878	July 20
AOSTA, AMEDEO, DUKE OF, Italian army officer	Oct. 21, 1898	Mar. 3
ARNOLD, BION JOSEPH, U.S. electrical engineer	Aug. 14, 1861	Jan. 29
ARTHUR, JOSEPH CHARLES, U.S. botanist.	Jan. 11, 1850	Apr. 30
ASSOLLANT, JEAN, French aviator	Sept. 26, 1905	May 9?
ATHOLL, JOHN GEORGE STEWART-MURRAY, 8TH DUKE OF, Scottish peer	Dec. 15, 1871	Mar. 16
AYALA, EUSEBIO, Paraguayan statesman. . .	Aug. 14, 1875	June 4
BAILEY, VERNON, U.S. biologist	June 21, 1864	Apr. 20
BAILET-LATOUR, COUNT, HENRY DE, Belgian sportsman	Mar. 1, 1876	Jan. 7?
BARRYMORE, JOHN BLYTHE, U.S. actor. .	Feb. 15, 1882	May 29
BAUDRILLART, ALFRED, French cardinal, writer	Jan. 6, 1859	May 18
BAYARD, THOMAS FRANCIS, U.S. congressman	June 4, 1868	July 12

James Joyce (1882-1941); Ignace Jan Paderewski (1860-1941); John Barrymore (1882-1942); Franz Boas (1858-1942)





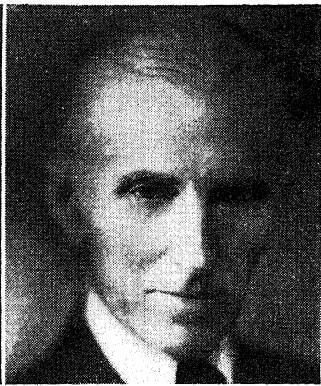
George M. Cohan (1878-1942); Felix Weingartner (1863-1942);
Grant Wood (1892-1942); George Washington Carver (1864-1943)

Name	Birth date	Death date	Name	Birth date	Death date
BEAUX, CECILIA, U.S. portrait painter. . . .	1863	Sept. 17	ELLIOTT, JOHN LOVEJOY, U.S. educator . .	Dec. 2, 1868	Apr. 12
BERCHTOLD VON UND ZU UNGAR- SCHITZ, COUNT, LEOPOLD, Austro-Hun- garian statesman.	Apr. 18, 1863	Nov. 21?	ENGEL, KURT, Austrian pianist	Jan. 14, 1909	Jan. 22
BERNACCHI, LOUIS CHARLES, British ex- plorer, scientist	1876	Apr. 24	EPSTEIN, ABRAHAM, U.S. social insurance expert	Apr. 20, 1892	May 2
BERRY, MARTHA McCHESNEY, U.S. edu- cator.	Oct. 7, 1866	Feb. 27	ESPEREY, FRANCHET D', FRANÇOIS, French army officer	May 25, 1856	July 8
BESIER, RUDOLF, British dramatist	July 2, 1878	June 15	ESTAUNIÉ, ÉDOUARD, French novelist . .	Feb. 4, 1862	Apr. 2
BILLINGTON, ROSE ANN, U.S. suffragist . .	1859?	Oct. 12	FARISH, WILLIAM STAMPS, U.S. oil executive	Feb. 23, 1881	Nov. 29
BLOMFIELD, SIR REGINALD, British architect	Dec. 20, 1856	Dec. 28?	FAWCETT, EDWARD, British anatomist . .	May 18, 1867	Sept. 22
BOAS, FRANZ, U.S. anthropologist	July 9, 1858	Dec. 21	FEILER, ARTHUR, U.S. economist	1879	July 11
BOGGIANI, TOMMASO PIO, Italian cardinal.	Jan. 19, 1863	Feb. 26	FERRERO, GUGLIELMO, Italian historian. .	July 31, 1871	Aug. 4?
BORNO, LOUIS, Haitian politician.	Sept. 20, 1865	July 29	FEUERMANN, EMANUEL, Austrian cellist . .	Nov. 22, 1902	May 25
BOSCH, ROBERT, German industrialist, manu- facturer	Sept. 23, 1861	Mar. 12	FIELD, RACHEL, U.S. author	Sept. 19, 1894	Mar. 15
BOULE, PIERRE MARCELIN, French scientist.	Jan. 1, 1861	July 19	FINUCANE, BRENDAN (PADDY), British war ace	1921	July 17?
BRAGG, SIR WILLIAM HENRY, British scien- tist.	July 2, 1862	Mar. 12	FISKE, BRADLEY ALLEN, U.S. naval officer .	June 13, 1854	Apr. 6
BRAMAH, ERNEST, British writer	1868?	June 26	FISKE, CHARLES, U.S. Episcopal bishop . .	Mar. 16, 1868	Jan. 8
BRIGGS, CASPAR WARREN, U.S. photog- rapher	1846?	July 10	FISKE, HARRISON GREY, U.S. playwright, theatrical manager.	July 30, 1861	Sept. 2
BRISTOL, ARTHUR LE ROY, U.S. naval of- ficer	July 15, 1886	Apr. 20	FITZPATRICK, SIR CHARLES, Canadian judge, politician	Dec. 19, 1851	June 17
BROWN, WADE HAMPTON, U.S. pathologist.	Oct. 18, 1878	Aug. 4	FOKINE, MICHEL, U.S. choreographer, ballet master	Apr. 26, 1880	Aug. 22
BUCKNER, THOMAS AYLETTE, U.S. insur- ance executive.	Jan. 18, 1865	Aug. 8	FRANCKENSTEIN, CLEMENS VON, German composer.	July 14, 1875	Aug. 22
CALLAGHAN, DANIEL JUDSON, U.S. naval officer	July 26, 1890	Nov. 13	GALE, HENRY GORDON, U.S. physicist. . .	Sept. 12, 1874	Nov. 16
CALVÉ, EMMA (EMMA DE ROQUER), French opera singer	1858?	Jan. (?)	GARFIELD, HARRY AUGUSTUS, U.S. edu- cator.	Oct. 11, 1863	Dec. 12
CAPABLANCA, JOSÉ RAOUL, Cuban chess champion.	Nov. 19, 1888	Mar. 8	GARRATT, GEOFFREY THEODORE, British author	1888	May 1?
CARLILE, WILSON, British clergyman	Jan. 14, 1847	Sept. 26	GARRETT, JOHN WORK, U.S. diplomat. . .	May 19, 1872	June 26
CARNEY, THOMAS JOSEPH, U.S. business executive	Apr. 7, 1886	June 29	GENTHE, ARNOLD, U.S. photographer . . .	Jan. 8, 1869	Aug. 9
CARR, WILBUR JOHN, U.S. state department official	Oct. 31, 1870	June 26	GEORGE, HAROLD H., U.S. army air officer.	Sept. 14, 1892	Apr. 30?
CHAMPION, PIERRE, French historian. . . .	1880	June 29	GEST, MORRIS, U.S. theatrical producer . .	Jan. 17, 1881	May 16
CHANG CHING-HUI, Chinese politician . . .	1871	Dec. (?)	GIBBS, GEORGE, U.S. novelist, artist. . .	Mar. 8, 1870	Oct. 10
COHAN, GEORGE MICHAEL, U.S. actor	July 4, 1878	Nov. 5	GILMORE, JOHN WASHINGTON, U.S. edu- cator.	May 9, 1872	June 25
COLBY, NATHALIE SEDGWICK, U.S. novelist	Feb. 4, 1875	June 10	GORTNER, ROSS AIKEN, U.S. chemist . . .	Mar. 20, 1885	Sept. 30
CONNAUGHT, ARTHUR WILLIAM PAT- RICK ALBERT, DUKE OF, British duke . .	May 1, 1850	Jan. 16	GRANT, ELIHU, U.S. educator, archaeologist	July 12, 1873	Nov. 2
COOPER, SIR EDWIN, British architect . .	1874	June 24	HACKETT, CHARLES, U.S. opera singer . .	Nov. 4, 1889	Jan. 1
CORRIGAN, JOSEPH MORAN, U.S. clergy- man, educator.	May 18, 1879	June 9	HAMILTON, COSMO, British author. . . .	1872?	Oct. 14
CRAM, RALPH ADAMS, U.S. architect. . . .	Dec. 16, 1863	Sept. 22	HARPER, WILLIAM ALLEN, U.S. educator . .	Apr. 27, 1880	May 11
CREWS, LAURA HOPE, U.S. actress. . . .	1880	Nov. 13	HARRINGTON, JOHN LYLE, U.S. construc- tion engineer	Dec. 7, 1868	May 20
CROZIER, WILLIAM, U.S. artilleryman, inven- tor.	Feb. 19, 1855	Nov. 10	HENDERSON, SIR NEVILLE MEYRICK, Brit- ish statesman	June 10, 1882	Dec. 29
CRUZE, JAMES, U.S. motion picture director	1884	Aug. 3	HERTZ, ALFRED, U.S. conductor	July 15, 1872	Apr. 17
CURTIS, HEBER DOUST, U.S. astronomer. .	June 27, 1872	Jan. 8	HERTZOG, JAMES BARRY MUNNIK, South African politician	Apr. 3, 1866	Nov. 21
DANDURAND, RAOUL, Canadian statesman .	Nov. 4, 1861	Mar. 11	HEYDRICH, REINHARD, German police of- ficial.	Mar. 7, 1904	June 4
DARLAN, JEAN LOUIS XAVIER FRANÇOIS, French naval officer, politician.	Aug. 7, 1881	Dec. 24	HILL, WILLIAM "RED", Canadian swimmer .	Oct. 22, 1886	May 14
DAUDET, LÉON, French writer, politician. .	Nov. 16, 1867	July 1	HILLHOUSE, PERCY ARCHIBALD, British naval architect	Mar. 4, 1869	Sept. 28
DAVIS, ROBERT HOBART (BOB), U.S. editor, writer	Mar. 23, 1869	Oct. 11	HOLLINS, ALFRED, British organist, composer.	Sept. 11, 1865	May 17
DE BECK, WILLIAM, U.S. cartoonist. . . .	Apr. 16, 1890	Nov. 11	HOLMES, PHILLIPS, U.S. actor.	July 22, 1909	Aug. 12
DE LEE, JOSEPH BOLIVAR, U.S. obstetrician.	Oct. 28, 1869	Apr. 2	HORNBLow, ARTHUR, U.S. editor, writer. .	1865	May 6
DEMING, EDWIN WILLARD, U.S. painter, sculptor	Aug. 26, 1860	Oct. 15	HORTHY, STEPHEN, Hungarian vice-regent	1904	Aug. 20?
DEWEY, DAVIS RICH, U.S. economist, educator	Apr. 7, 1858	Dec. 13	HOWE, HARRISON ESTELL, U.S. chemist. .	Dec. 15, 1881	Dec. 10
DITMARS, RAYMOND LEE, U.S. naturalist . .	June 20, 1876	May 12	HUBENY, MAXIMILIAN JOHN, U.S. radiol- ogist	Oct. 12, 1880	July 2
DODGE, RAYMOND, U.S. psychologist. . . .	Feb. 20, 1871	Apr. 8	INMAN, ONDESS LAMAR, U.S. scientist. . .	Nov. 11, 1890	July 21
EATON, EDWARD DWIGHT, U.S. educator . .	Jan. 12, 1851	June 18	JACKSON, WILLIAM HENRY, U.S. photog- rapher	Apr. 4, 1843	June 30
EBERLE, ABASTENIA ST. LEGER, U.S. sculptress.	Apr. 6, 1878	Feb. 26	JAMES, WILLIAM RODERICK (WILL), U.S. author, painter	June 6, 1892	Sept. 3
ELIAS, ALOIS, Czech army officer and premier.	1890	June (?)	JOHNSON, HUGH SAMUEL, U.S. army officer, administrator, columnist	Aug. 5, 1882	Apr. 15
			JOSEPH FERDINAND, ARCHDUKE, head of Tuscan branch of house of Hapsburg . .	May 24, 1872	Aug. 28
			KAHN, ALBERT, U.S. architect	Mar. 21, 1869	Dec. 8

Name	Birth date	Death date	Name	Birth date	Death date
KANEKO, COUNT, KENTARO, Japanese statesman	Apr. 1853	May 16	RUCKSTULL, FREDERICK WELLINGTON, U.S. sculptor	May 22, 1853	May 26
KARNEBEEK, HERMAN ADRIAAN VAN, Netherlands diplomat	Aug. 21, 1874	Apr. 2?	RUFF, ROBERT HAMRIC, U.S. clergyman, educator	July 27, 1887	May 5 1867?
KENT, DUKE OF, youngest brother of King George VI	Dec. 20, 1902	Aug. 25	RUGH, JAMES TORRANCE, U.S. orthopaedist	1867?	Oct. 12
KEYES, CHARLES ROLLIN, U.S. geologist	Dec. 24, 1864	May 18	SARG, ANTHONY FREDERICK "TONY", U.S. artist, puppeteer, author	Apr. 24, 1882	Mar. 7
KNABENSHUE, PAUL, U.S. foreign service officer	Oct. 31, 1883	Feb. 1	SAUER, EMIL VON, German pianist	Oct. 8, 1862	Apr. 29?
LEDOCHOWSKI, VLADIMIR, superior general of Society of Jesus	Oct. 7, 1866	Dec. 13	SAYDAM, REFIK, Turkish premier	1881	July 7
LEJEUNE, JOHN ARCHER, U.S. marine corps officer	Jan. 10, 1867	Nov. 20	SCHNEIDER, EUGENE, French munitions manufacturer	Oct. 29, 1868	Nov. 17?
LEVI-CIVITA, TULLIO, Italian mathematician	Mar. 29, 1873	Jan. 1?	SCHOFIELD, FRANK HERMAN, U.S. naval officer	Jan. 4, 1869	Feb. 20
LILLIE, GORDON W. (PAWNEE BILL), U.S. frontiersman and showman	Feb. 14, 1860	Feb. 3	SCHURMAN, JACOB GOULD, U.S. diplomat, educator	May 22, 1854	Aug. 12
LOMBARD, CAROLE (CAROL JANE PETERS), U.S. motion picture star	Oct. 6, 1908	Jan. 16	SCOTT, NORMAN, U.S. naval officer	Aug. 10, 1889	Nov. 13
McCLINTIC, GEORGE WARWICK, U.S. federal judge	Jan. 14, 1866	Sept. 25	SEIGNOBOS, CHARLES, French historian	Sept. 10, 1854	Apr. 29?
McNAMEE, GRAHAM, U.S. radio announcer	July 10, 1888	May 9	SICKERT, WALTER RICHARD, British painter and etcher	May 31, 1860	Jan. 23
MacSWINEY, MARY, Irish Republican leader	(?)	Mar. 7	SKINNER, OTIS, U.S. actor	June 28, 1858	Jan. 4
MAHIN, FRANK C., U.S. army officer	May 27, 1887	July 24	SMITH, ALBERT WILLIAM, U.S. educator, engineer	Aug. 30, 1856	Aug. 16
MALINOWSKI, BRONISLAW KASPER, British anthropologist	Apr. 7, 1884	May 16	SMITH, SIR GEORGE ADAM, British biblical scholar	Oct. 19, 1856	Mar. 3
MARGUERITTE, VICTOR, French novelist	Dec. 1, 1866	Mar. 23	SNOOK, HOMER CLYDE, U.S. electrophysicist	Mar. 25, 1878	Sept. 22
MATHESON, SAMUEL PRITCHARD, Canadian archbishop	Sept. 20, 1852	May 19	SPENDER, JOHN ALFRED, British journalist	1862	June 21
MERRIAM, CLINTON HART, U.S. biologist, naturalist	Dec. 5, 1855	Mar. 19	SPURGEON, CAROLINE FRANCES ELEA-NOR, British educator, writer	1869	Oct. 24
MIDDLETON, WILLIAM ST. JOHN FREMANTLE BRODRICK, 1ST EARL OF, British statesman	Dec. 14, 1856	Feb. 13	STAINFORTH, G. H., British air ace	1899?	Sept. 30?
MIKELL, HENRY JUDAH, U.S. bishop	Aug. 4, 1873	Feb. 20	STAUNING, THORVALD, Danish premier	Oct. 26, 1873	May 3
MILLARD, THOMAS FRANKLIN FAIRFAX, U.S. newspaperman	July 8, 1868	Sept. 8	STEER, PHILIP WILSON, British artist	Dec. 28, 1860	Mar. 21
MILLER, ALICE DUER, U.S. author	July 28, 1874	Aug. 22	STOCK, FREDERICK AUGUST, U.S. conductor, composer	Nov. 11, 1872	Oct. 20
MONTGOMERY, LUCY MAUD (MRS. EWAN MACDONALD), Canadian author	Nov. 30, 1874	Apr. 24	SUTHERLAND, GEORGE, U.S. supreme court judge	Mar. 25, 1862	July 18
MOONEY, THOMAS J., U.S. labour leader	1882	Mar. 6	TALBOT, ARTHUR NEWELL, U.S. engineer	Oct. 21, 1857	Apr. 3
MORRIS, IRA NELSON, U.S. diplomat, author	Mar. 8, 1875	Jan. 15	TEMPEST, DAME MARY SUSAN, British actress	July 15, 1866	Oct. 15
MAST, CONDÉ, U.S. publisher	Mar. 26, 1874	Sept. 19	TERHUNE, ALBERT PAYSON, U.S. author	Dec. 21, 1872	Feb. 18
NAYLOR, WILLIAM KEITH, U.S. army officer	Nov. 24, 1874	Aug. 3	TERRA, GABRIEL, Uruguayan politician	1872	Sept. 15
NEWKIRK, JOHN VAN KUREN ("SCARSDALE JACK"), U.S. navy flier	Oct. 15, 1913	Mar. 24	TINKER, CLARENCE LEONARD, U.S. army officer	Nov. 21, 1887	June 7?
NOEL, CONRAD LE DESPENSER RODEN, British clergyman	July 12, 1869	July 23	TODT, FRITZ, German engineer	Sept. 4, 1891	Feb. 8
NORDSTRÖM, LUDVIG ANSELM, Swedish author	1882	Apr. 15	TROY, JOHN WEIR, U.S. politician	Oct. 31, 1868	May 2
OCKER, WILLIAM C., U.S. aviation inventor	June 18, 1880	Sept. 15	TUFTS, JAMES HAYDEN, U.S. educator	July 9, 1862	Aug. 6
O'FLANAGAN, MICHAEL, Irish clergyman, politician	Aug. 13, 1876	Aug. 7	TURNBULL, MARGARET, U.S. author	(?)	June 12
OLIVER, EDNA MAY, U.S. actress	Nov. 9, 1883	Nov. 9	TURNER, SIR BEN, British labour and political leader	1863	Sept. 30
OLIVER, SIR THOMAS, British physician	Mar. 2, 1853	May 16	VANDERBILT, CORNELIUS, III, U.S. capitalist	Sept. 5, 1873	Mar. 1
ORTIZ, ROBERTO M., Argentine president	Sept. 24, 1886	July 15	VISSER, LODEWIJK ERNST, Dutch jurist	Aug. 21, 1871	Feb. 24
PACKARD, FRANK LUCIUS, Canadian-U.S. author	Feb. 2, 1877	Feb. 17	VOLIVA, WILBUR GLENN, U.S. clergyman	Mar. 10, 1870	Oct. 11
PARKER, JOHN HENRY, U.S. army officer	Sept. 19, 1866	Oct. 13	WAGNER, BOYD DAVID, U.S. army air officer	Oct. 26, 1916	Nov. 30?
PARSEVAL, AUGUST VON, German dirigible builder	Feb. 5, 1861	Feb. 23	WARREN, JOSEPH, U.S. educator	Mar. 16, 1876	Sept. 19
PATRICK, MASON MATHEWS, U.S. army officer	Dec. 13, 1863	Jan. 29	WEBER, JOSEPH (JOE) M., U.S. actor, manager	Aug. 11, 1867	May 10
PAUL, MAURY HENRY BIDDLE (CHOLLY KNICKERBOCKER), U.S. society editor	Apr. 14, 1890	July 17	WEINGARTNER, FELIX, Yugoslav-Swiss composer, conductor	June 2, 1863	May 7
PAVLOVICH, DIMITRI, GRAND DUKE, Russian nobleman	Sept. 6, 1891	Mar. 6	WELLS, CAROLYN, U.S. author	(?)	Mar. 26
PÉRET, RAOUL, French politician	Nov. 29, 1870	July 22	WESTLEY, HELEN, U.S. actress	Mar. 1879	Dec. 12
PERRIN, JEAN, French physicist	Sept. 30, 1870	Apr. 17	WHITESIDE, WALKER, U.S. actor	Mar. 16, 1869	Aug. 17
PESSÔA, EPITACIO DA SILVA, Brazilian politician and jurist	May 23, 1865	Feb. 13	WILCOX, JOHN WALTER, JR., U.S. naval officer	Mar. 22, 1882	Mar. 27
PETRIE, SIR (WILLIAM MATTHEW) FLINDERS, British archaeologist	June 3, 1853	July 28	WILLARD, DANIEL, U.S. railroad executive	Jan. 28, 1861	July 6
POLITIS, NICOLAS SOCRATE, Greek jurist, diplomatist	1872	Mar. 4	WILLSON, BECKLES, Canadian author	Aug. 26, 1869	Sept. 18
PORRAS, BELISARIO, Panaman politician	Nov. 28, 1856	Aug. 28	WILLSTAETTER, RICHARD, German scientist	Aug. 13, 1872	Aug. 3?
POULSEN, VALDEMAR, Danish engineer	Nov. 25, 1869	Aug. (?)	WILSON, JOHN ARTHUR, U.S. chemist	Aug. 16, 1890	Sept. 10
PRYOR, ARTHUR, U.S. band leader	Sept. 22, 1870	June 18	WILSON, (ROBERT) FORREST, U.S. writer	Jan. 20, 1883	May 9
REEVES, JESSE SIDDALL, U.S. educator	Jan. 27, 1872	July 7	WINDHAM, SIR WALTER GEORGE, British aviation pioneer	1868	July 6
REICHENAU, WALTER VON, German field marshal	1884	Jan. 17?	WOOD, GRANT, U.S. artist	Feb. 13, 1892	Feb. 12
REISNER, GEORGE ANDREW, U.S. Egyptologist	Nov. 5, 1867	June 7	WORK, HUBERT, U.S. politician	July 3, 1860	Dec. 14
RELANDER, LAURI KRISTIAN, Finnish statesman	May 31, 1883	Feb. 9	YOUNGHUSBAND, SIR FRANCIS (EDWARD), British explorer	May 31, 1863	July 31
RHODES, EDGAR NELSON, Canadian statesman	Jan. 5, 1877	Mar. 15	ZEMLINSKY, ALEXANDER VON, Austrian composer, conductor	Oct. 4, 1872	Mar. 16
RICE, ALICE CALDWELL HEGAN, U.S. author	Jan. 11, 1870	Feb. 10	ZWEIG, STEFAN, Austrian author	Nov. 28, 1881	Feb. 23
ROBSON, MAY, U.S. actress	Apr. 19, 1858	Oct. 20			
ROCA, JULIO ARGENTINO, Argentine politician	May 17, 1873	Oct. 8			

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ABD-EL-AZIZ IV, sultan of Morocco	Feb. 24, 1878	June 9
ABERHART, WILLIAM, Canadian politician	Dec. 30, 1878	May 23
AMES, JOSEPH SWEETMAN, U.S. physicist, educator	July 3, 1864	June 24
ANDREWS, CHARLES McLEAN, U.S. historian, educator	Feb. 22, 1863	Sept. 9
ANDREWS, FRANK MAXWELL, U.S. army officer	Feb. 3, 1884	May 3
ANTOINE, ANDRÉ, French actor-manager	Jan. 31, 1851	Oct. 21?
APPLEYARD, ROLLO, British consulting engineer	Jan. 1, 1867	Mar. 1
ARMITAGE, ALBERT BORLASE, British explorer	July 2, 1864	Nov. 2
ARONSON, NAOUM, Russian sculptor	1872?	Sept. 30
BARBOUR, W. WARREN, U.S. politician	July 31, 1888	Nov. 22
BARCLAY, McCLELLAND, U.S. illustrator	May 9, 1893	July 19?



John Pierpont Morgan (1867-1943); Sergei Rachmaninoff (1873-1943); Max Reinhardt (1873-1943); Nikola Tesla (1856-1943)

Name	Birth date	Death date	Name	Birth date	Death date
BARKER, LEWELLYS FRANKLIN, U.S. physician, educator	Sept. 16, 1867	July 13	ELY, RICHARD THEODORE, U.S. economist	Apr. 13, 1854	Oct. 4
BARR, NORMAN BURTON, U.S. welfare worker	Jan. 27, 1868	Apr. 1	EWING, JAMES, U.S. pathologist	Dec. 25, 1866	May 16
BAUR, HARRY, French actor	1880?	Apr. 8?	FISH, BERT, U.S. foreign service official	Oct. 8, 1875	July 21
BEATTY, SIR EDWARD WENTWORTH, Canadian railroad executive	Oct. 16, 1877	Mar. 23	FITZROY, EDWARD ALGERNON, British politician	July 24, 1869	Mar. 3?
BEERS, CLIFFORD WHITTINGHAM, U.S. pioneer in mental hygiene	Mar. 30, 1876	July 9	FORD, EDELL BRYANT, U.S. automobile manufacturer	Nov. 6, 1893	May 26
BENÉT, STEPHEN VINCENT, U.S. poet	July 22, 1898	Mar. 13	FREEMAN, JAMES EDWARD, U.S. clergyman	July 24, 1866	June 6
BERNIE, BEN, U.S. orchestra leader, actor	1891?	Oct. 20	FREEMAN, RICHARD AUSTIN, British writer	1862	Sept. 30
BEVAN, ARTHUR DEAN, U.S. surgeon	Aug. 9, 1861	June 10	FUQUA, STEPHEN OGDEN, U.S. army officer	Dec. 25, 1874	May 11
BINYON, LAURENCE, British poet, critic	Aug. 10, 1869	Mar. 10	GAGER, CHARLES STUART, U.S. botanist	Dec. 23, 1872	Aug. 9
BIRCH, REGINALD BATHURST, U.S. artist, illustrator	May 2, 1856	June 17	GALWAY, GEORGE VERE ARUNDELL MONCKTON-ARUNDELL, 8TH VIS-COUNT, Irish peer	Mar. 24, 1882	Mar. 27
BLEDSE, JULIUS (JULES) C., U.S. Negro singer	Dec. 29, 1898	July 14	GEORGE OF BAVARIA, PRINCE, Bavarian churchman	Apr. 2, 1880	June 1?
BORIS III, king of the Bulgarians	Jan. 30, 1894	Aug. 28	GLYN, ELINOR (MRS. CLAYTON GLYN), British author	Oct. 17, 1864	Sept. 23
BOSWORTH, HOBART VAN ZANDT, U.S. actor	Aug. 11, 1867	Dec. 30	GRAY, GEORGE KRUGER, British artist	Dec. 25, 1880	May 4?
BOUTENS, PETER CORNELIS, Netherlands poet	Feb. 20, 1870	Mar. 14	GREGORY, JACKSON, U.S. author	Mar. 12, 1882	June 12
BRACCO, ROBERTO, Italian dramatist	Nov. 10, 1861	Apr. 21	HALL, RADCLIFFE, British novelist, poet	1886?	Oct. 7
BRIDGMAN, GEORGE B., U.S. artist and art teacher	Nov. 5, 1864	Dec. 16	HALL, SIR (WILLIAM) REGINALD, British naval intelligence officer	June 28, 1870	Oct. 22
BUMPUS, HERMON CAREY, U.S. educator	May 5, 1862	June 21	HAMMERSTEIN-EQUORD, BARON KURT VON, German army officer	Sept. 16, 1878	Apr. 24
BURNS, JOHN, British politician	Oct. 20, 1858	Jan. 24	HARPER, SAMUEL NORTHRUP, U.S. educator	Apr. 9, 1882	Jan. 18
BYRON, ARTHUR WILLIAM, U.S. actor	Apr. 3, 1872	July 16	HARRINGTON, GORDON SIDNEY, Nova Scotian politician	Aug. 7, 1883	July 4
CADY, HAMILTON PERKINS, U.S. chemist, educator	May 2, 1874	May 26	HART, ALBERT BUSHNELL, U.S. educator	July 1, 1854	June 16
CARVER, GEORGE WASHINGTON, U.S. chemurgist	1864?	Jan. 5	HART, LORENZ (LARRY), U.S. musician and songwriter	May 2, 1895	Nov. 22
CATTANI, FEDERICO, Italian cardinal	Apr. 17, 1856	Apr. 12	HARTLEY, MARSDEN, U.S. painter	Jan. 4, 1877	Sept. 2
CAZALET, VICTOR ALEXANDER, British M.P.	Dec. 27, 1896	July 4	HASSANI, MOHAMED TAGEDDINE EL, sheik, Syrian politician	1886	Jan. 17
CHITTENDEN, RUSSELL HENRY, U.S. physiological chemist	Feb. 18, 1856	Dec. 26	HAWKES, HERBERT EDWIN, U.S. educator	Dec. 6, 1872	May 4
CHURCH, SAMUEL HARDEN, U.S. industrialist	Jan. 24, 1858	Oct. 11	HAYASHI, SENJURO, Japanese army officer, statesman	Feb. 23, 1876	Feb. 4?
CLAIR, MATTHEW WESLEY, U.S. Negro clergyman	Oct. 21, 1865	June 28	HEWARD, LESLIE HAYS, British musician, composer	Dec. 8, 1897	May 3
CLAWSON, RUDGER, U.S. Mormon church leader	Mar. 12, 1857	June 21	HILBERT, DAVID, German mathematician	Jan. 23, 1862	Feb. (2)
COATES, JOSEPH GORDON, New Zealand statesman	1878	May 27	HINSLEY, ARTHUR, British cardinal	Aug. 25, 1865	Mar. 17
COLLES, HENRY COPE, British music critic, author	Apr. 20, 1879	Mar. 4	HOWARD, LESLIE, British actor	Apr. 3, 1893	June 1
CREMONESI, CARLO, Italian cardinal	Nov. 4, 1866	Nov. 25	HRDLICKA, ALES, U.S. anthropologist	Mar. 29, 1869	Sept. 5
CRILE, GEORGE WASHINGTON, U.S. surgeon, scientist	Nov. 11, 1864	Jan. 7	INGRAM, WILLIAM, U.S. marine corps officer, football coach	1897?	June 2
CRUMIT, FRANK, U.S. stage and radio star	1889	Sept. 7	JACOBS, WILLIAM WYMARK, British author	Sept. 8, 1863	Sept. 1
CUDAHY, JOHN, U.S. diplomat	Dec. 10, 1887	Sept. 6	JESPERSEN, JENS OTTO HARRY, Danish philologist, educator	July 16, 1860	Apr. 30
DAFOE, ALLAN ROY, Canadian physician	May 29, 1883	June 2	JESSCHONNEK, HANS, German army officer	Dec. 10, 1898	Aug. 20?
DANCHENKO, VLADIMIR NEMIROVICH, Russian theatrical producer	1858?	Apr. 25	JUSTO, AGUSTÍN P., Argentine statesman	Feb. 26, 1876	Jan. 10
DARWIN, LEONARD, British economist, eugenicist	Jan. 15, 1850	Mar. 21	KELLY, HOWARD ATWOOD, U.S. surgeon, radiologist	Feb. 20, 1858	Jan. 12
DE GEER, BARON, GERARD (JAKOB), Swedish geologist	Oct. 2, 1858	July 23	KENT, RAYMOND ASA, U.S. college president	July 21, 1883	Feb. 26
DELAFIELD, E. M. (MRS. ELIZABETH M. DASHWOOD), British novelist	1891	Dec. 2	KEPPEL, FREDERICK PAUL, U.S. educator	July 2, 1875	Sept. 8
DENNIS, CHARLES HENRY, U.S. newspaper editor	Feb. 8, 1860	Sept. 25	KINNICK, NILE CLARKE, JR., U.S. football star	1919?	June 2
DICKINSON, LUREN DUDLEY, U.S. politician	Apr. 15, 1859	Apr. 22	KISCH, FREDERICK HERMANN, British army officer	Aug. 1888	Apr. 11
DICKINSON, WILLOUGHBY HYETT DICKINSON, 1ST BARON, British statesman	Apr. 9, 1859	June 1	KNIGHT, ERIC, British author	Apr. 10, 1897	Jan. 15
DITTER, J. WILLIAM, U.S. congressman	Sept. 5, 1888	Nov. 21	LA FONTAINE, HENRI, Belgian politician	Apr. 22, 1854	May 26?
DUNCAN, SIR PATRICK, British politician	Dec. 21, 1870	July 17	LANDSTEINER, KARL, U.S. medical research scientist	June 14, 1868	June 26
DU PONT, RICHARD CHICHESTER, U.S. glider champion	Jan. 2, 1911	Sept. 11	LAPARRA, RAÓUL, French composer	May 13, 1876	Apr. 4
			LA PUMA, VINCENZO, Italian cardinal	Jan. 22, 1874	Nov. 4
			LEONARD, ADNA WRIGHT, U.S. clergyman	Nov. 2, 1874	May 3
			LINDSEY, BENJAMIN BARR, U.S. judge	Nov. 25, 1869	Mar. 26
			LINK, MRS. ADELINE DE SALE, U.S. chemist	Jan. 4, 1892	Nov. 20
			LIN SEN, Chinese president	1864	Aug. 1
			LOFTUS, MARIE CECILIA (CISSIE), British actress	Oct. 22, 1876	July 12
			LOWDEN, FRANK ORREN, U.S. politician	Jan. 26, 1861	Mar. 20

Name	Birth date	Death date
LOWELL, ABBOTT LAWRENCE, U.S. educator.	Dec. 13, 1856	Jan. 6
LUTZ, FRANK EUGENE, U.S. entomologist.	Sept. 15, 1879	Nov. 27
LUTZE, VIKTOR, German Storm Troop chief.	Dec. 28, 1890	May 2
McADIE, ALEXANDER GEORGE, U.S. meteorologist.	Aug. 4, 1863	Nov. 1
McINTYRE, MARVIN HUNTER, U.S. journalist and secretary to Pres. F. D. Roosevelt.	Nov. 27, 1878	Dec. 13
McKENNA, REGINALD, British financier, politician.	July 6, 1863	Sept. 6
MAGEE, JOHN BENJAMIN, U.S. educator.	July 19, 1887	Apr. 6
MANDEL, GEORGES, French politician.	June 5, 1885	June (?)
MARMON, HOWARD C., U.S. motorcar manufacturer.	May 24, 1876	Apr. 4
MARSHALL, TULLY (WILLIAM PHILLIPS), U.S. actor.	Apr. 13, 1864	Mar. 10
MARVIN, CHARLES FREDERICK, U.S. meteorologist.	Oct. 7, 1858	June 5
MELLO FRANCO, AFRANIO DE, Brazilian statesman.	Feb. 25, 1870	Jan. 1
MELONEY, MARIE MATTINGLY (MRS. WILLIAM BROWN MELONEY), U.S. editor.	1883?	June 23
MILLERAND, ALEXANDRE, French politician.	Feb. 10, 1859	Apr. 6
MILYUKOV, PAUL NIKOLAYEVICH, Russian politician, historian.	Jan. 27, 1859	Mar. 31
MOLTKE, HANS ADOLF VON, German diplomat.	Nov. 29, 1884	Mar. 22
MORDACQ, JEAN-JULES-HENRI, French army officer.	Jan. 12, 1868	Apr. 12
MORGAN, JOHN PIERPONT, U.S. financier.	Sept. 7, 1867	Mar. 13
MOWINCKEL, JOHAN LUDWIG, Norwegian politician.	1870	Sept. 30
MUTI, ETTORE, Italian air officer, politician.	May 22, 1902	Aug. 24?
NASH, PATRICK A., U.S. politician.	1863	Oct. 6
NIELSEN, ALICE, U.S. singer.	June 7, 1876	Mar. 8
OAKES, SIR HARRY, British baronet.	Dec. 23, 1874	July 8
O'BRIEN, FRANK MICHAEL, U.S. newspaper editor.	Mar. 31, 1875	Sept. 22
O'DAY, CAROLINE GOODWIN, U.S. congresswoman.	June 22, 1875	Jan. 4
O'HARE, EDWARD HENRY, U.S. naval air officer.	Mar. 13, 1914	Nov. (?)
OLDS, ROBERT, U.S. army air officer.	June 15, 1896	Apr. 28
OLIVIER, SYDNEY OLIVIER, 1ST BARON, OF RAMSDEN, British statesman.	Apr. 16, 1859	Feb. 15
ONEGIN, SIGRID, German-Swedish opera singer.	June 1, 1891	June 18?
OPPENHEIMER, FRANZ, German sociologist and politician.	Mar. 30, 1864	Sept. 30
ORLEBAR, AUGUSTUS H., British air officer.	1897?	Aug. 4
PADDOCK, CHARLES WILLIAM, U.S. editor, track star, marine corps officer.	Aug. 11, 1900	July 21
PEEK, GEORGE NELSON, U.S. manufacturer and agricultural expert.	Nov. 19, 1873	Dec. 17
PELLEGRINETTI, ERMENEGILDO, Italian cardinal.	Mar. 27, 1876	Mar. 29
PHELPS, WILLIAM LYON, U.S. educator, author.	Jan. 2, 1865	Aug. 21
POUND, SIR (ALFRED) DUDLEY (PICKMAN ROGERS), British naval officer.	Aug. 29, 1877	Oct. 21
RACHMANINOFF, SERGEI VASSILIEVITCH, U.S. pianist, composer.	Apr. 2, 1873	Mar. 28
RAMEY, HOWARD KNOX, U.S. army air officer.	Oct. 14, 1896	Mar. 26?
RAY, CHARLES, U.S. motion picture actor.	Mar. 15, 1891	Nov. 23
RAY, EDWARD (TED), British golf champion.	1877	Aug. 27
REINHARDT, MAX, U.S. theatrical producer.	Sept. 9, 1873	Oct. 31
RICE, CALE YOUNG, U.S. poet, dramatist.	Dec. 7, 1872	Jan. 24
RICHARDS, LAURA ELIZABETH, U.S. author.	Feb. 27, 1850	Jan. 14
ROBERTS, SIR CHARLES GEORGE DOUGLAS, Canadian author and poet.	Jan. 10, 1860	Nov. 26
ROOSEVELT, KERMIT, U.S. explorer, author, soldier.	Oct. 10, 1889	June 4
ROPER, DANIEL CALHOUN, U.S. politician.	Apr. 1, 1867	Apr. 11
ROSENFELD, KURT, German lawyer, politician.	Feb. 1, 1877	Sept. 26
ROWAN, ANDREW SUMMERS, U.S. army officer.	Apr. 23, 1857	Jan. 11
SCHLESINGER, FRANK, U.S. astronomer.	May 11, 1871	July 10
SELINCOURT, ERNEST DE, British educator, writer.	Sept. 24, 1870	May 22
SHAW, MRS. GEORGE BERNARD, wife of British playwright.	(?)	Sept. 12
SIKORSKI, WLADYSLAW, Polish politician, army officer.	May 20, 1881	July 4
SLEMP, CAMPBELL BASCOM, U.S. politician.	Sept. 4, 1870	Aug. 7
SPYKMAN, NICHOLAS JOHN, U.S. educator.	Oct. 13, 1893	June 26
STEAGALL, HENRY BASCOM, U.S. politician.	May 19, 1873	Nov. 22
STEIN, SIR AUREL, British archaeologist.	Nov. 26, 1862	Oct. 28
STIMSON, FREDERIC JESUP, U.S. legal scholar and statesman.	July 20, 1855	Nov. 19
STOESSEL, ALBERT FREDERIC, U.S. musician.	Oct. 11, 1894	May 12
SUEYRO, SABA H., Argentine politician, naval officer.	1890?	July 17
TAFT, HELEN HERRON (MRS. WILLIAM HOWARD TAFT), widow of U.S. president.	June 2, 1861	May 22
TESLA, NIKOLA, U.S. inventor.	July 10, 1856	Jan. 7
TREBITSCH-LINCOLN, IGNATIUS, Hungarian-born Buddhist monk.	1879	Oct. 7
TRYGGER, ERNST, Swedish politician.	1857?	Sept. 23
TUSSAUD, JOHN THEODORE, British sculptor.	May 2, 1858	Oct. 13
ULYANOV, DMITRI, Russian politician, medical research scientist.	1874	July 16
UNDERWOOD, BERT ELIAS, U.S. photographer.	Apr. 29, 1862	Dec. 27
UPSHUR, WILLIAM PETERKIN, U.S. marine corps officer.	Oct. 28, 1881	July 21
VEIDT, CONRAD, British actor.	Jan. 22, 1893	Apr. 3
VEILLER, BAYARD, U.S. playwright.	1869	June 16
VIDAL Y BARRAQUER, FRANCIS OF ASSISI, Spanish cardinal.	Oct. 3, 1868	Sept. 14?
WALLER, THOMAS W. ("FATS"), U.S. musician and composer.	1904?	Dec. 15
WARREN, WHITNEY, U.S. architect.	Jan. 29, 1864	Jan. 24
WEBB, BEATRICE POTTER, British Socialist, author.	Jan. 22, 1858	Apr. 30
WEBSTER, LESLIE TILLOTSON, U.S. medical research scientist.	July 23, 1894	July 12
WEDGWOOD, JOSIAH CLEMENT WEDGWOOD, 1ST BARON, OF BARLASTON, British M.P.	Mar. 16, 1872	July 26
WELLS, HARRY GIDEON, U.S. pathologist.	July 21, 1875	Apr. 26
WERTHEIMER, MAX, German psychologist, philosopher.	Apr. 15, 1880	Oct. 12
WIDENER, JOSEPH EARLY, U.S. turfman, financier.	Aug. 19, 1872	Oct. 26
WIGMORE, JOHN HENRY, U.S. educator.	Mar. 4, 1863	Apr. 20
WILEY, HENRY ARIOSTO, U.S. naval officer.	Jan. 31, 1867	May 20
WOOD, SIR KINGSLEY, British statesman.	1881	Sept. 21
WOOLLCOTT, ALEXANDER, U.S. author.	Jan. 19, 1887	Jan. 23
YAMAMOTO, ISOROKU, Japanese naval officer.	Apr. 4, 1884	Apr. 18
YAROSLAVSKY, EMELYAN, Russian historian and politician.	1878?	Dec. 5?
YERSIN, ALEXANDRE EMILE JOHN, Swiss bacteriologist.	Sept. 22, 1863	Mar. 2?
YOUNG, ARTHUR HENRY (ART), U.S. artist, cartoonist.	Jan. 14, 1866	Dec. 29
ZEEMAN, PIETER, Netherlands physicist.	May 25, 1865	Oct. 9

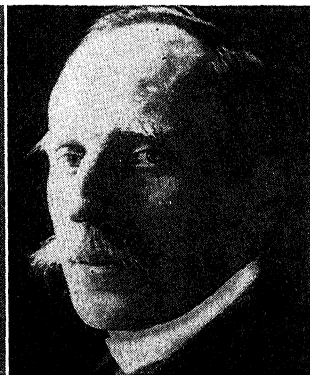
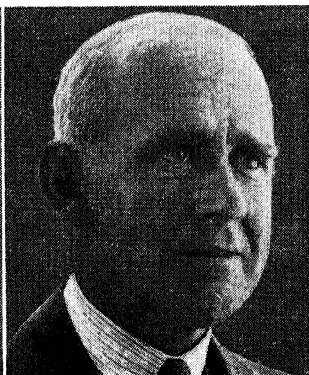
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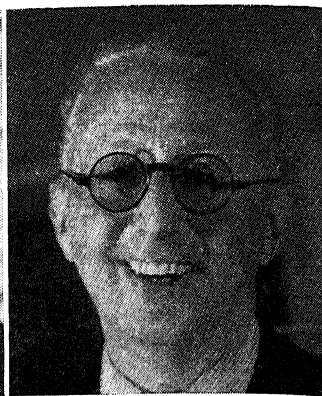
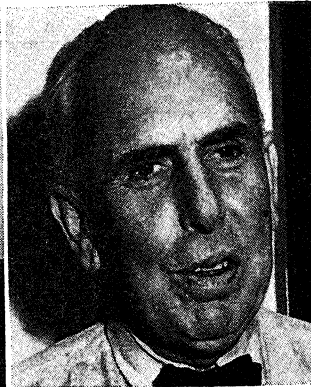
ABBAS II (ABBAS HILMI PASHA), khedive of Egypt.	July 14, 1874	Dec. 21
ADE, GEORGE, U.S. author.	Feb. 9, 1866	May 16
ALVAREZ QUINTERO, JOAQUIN, Spanish writer.	1873	June 14
ANDERSON, WILLIAM FRANKLIN, U.S. clergyman.	Apr. 22, 1860	July 22
ARMSTRONG, MARGARET NEILSON, U.S. author, illustrator.	Sept. 24, 1867	July 18
BAEKELAND, LEO HENDRIK, Belgian-born inventor.	Nov. 14, 1863	Feb. 23
BARBOUR, RALPH HENRY (RICHARD STILLMAN POWELL), U.S. author.	Nov. 13, 1870	Feb. 19
BATOCKI, MAX JOHANN OTTO ADOLF TORTILOVITZ VON, German politician.	July 31, 1868	June 8?
BAUER, GUSTAV, German politician.	Jan. 6, 1870	Sept. 27
BEACH, AMY MARCY CHENEY, U.S. pianist, composer.	Sept. 5, 1867	Dec. 27
BECK, JOSEF, Polish statesman.	Oct. 4, 1894	June 6
BECK, LUDWIG, German army officer.	1880?	July (?)
BELOW, OTTO VON, German army officer.	Jan. 18, 1857	Mar. 15?
BENNETT, RICHARD, U.S. actor.	May 21, 1872	Oct. 22
BESTOR, ARTHUR EUGENE, U.S. educator.	May 19, 1879	Feb. 3
BONO, EMILIO GIUSEPPE GASPARE GIOVANNI DE, Italian army officer, politician.	Mar. 19, 1866	Jan. 11
BOYD, JAMES, U.S. author.	July 2, 1888	Feb. 25
BREITSCHIED, RUDOLPH, German politician.	Nov. 2, 1874	Aug. 28?
BRESNAHAN, ROGER, U.S. baseball player.	1880?	Dec. 4
BRISTOW, JOSEPH LITTLE, U.S. politician.	July 22, 1861	July 14
BROOKHART, SMITH WILDMAN, U.S. politician.	Feb. 2, 1869	Nov. 15
BRYAN, JOHN STEWART, U.S. publisher, educator.	Oct. 23, 1871	Oct. 16
BUERCKEL, JOSEF, German politician.	Mar. 30, 1895	Sept. 29
CAILLAUX, JOSEPH MARIE AUGUSTE, French politician.	Mar. 30, 1863	Nov. 21
CANNON, JAMES, JR., U.S. clergyman.	Nov. 13, 1864	Sept. 6
CARREL, ALEXIS, French surgeon and biologist.	June 28, 1873	Nov. 5
CARTER, BOAKE (HAROLD THOMAS HENRY BOAKE-CARTER), U.S. news commentator.	Sept. 1898	Nov. 16
CARTER, WILLIAM SPENCER, U.S. educator.	Apr. 11, 1869	May 12
CASTELNAU, EDOUARD DE CURIÈRES DE, French army officer.	Dec. 24, 1851	Mar. 19

Name	Birth date	Death date
CASTILLO, RAMÓN S., Argentine politician	Nov. 20, 1873	Oct. 12
CATTELL, JAMES McKEEN, U.S. psychologist, editor	May 25, 1860	Jan. 20
CAVALIERI, LINA, Italian opera singer	Dec. 25, 1874	Feb. 7
CHAMINADE, CÉCILE, French composer	Aug. 8, 1861	Apr. 18?
CH'EN, EUGENE, Chinese politician, journalist	1878	May 20
CHRISTIE, JOHN WALTER, U.S. inventor	1867?	Jan. 11
CIANO, COUNT GALEAZZO, Italian politician	Mar. 18, 1903	Jan. 11
CLAPPER, RAYMOND, U.S. journalist and columnist	May 30, 1892	Feb. 2
COBB, IRVIN SHREWSBURY, U.S. author and humorist	June 23, 1876	Mar. 10
COLIJN, HENDRICK, Netherlands statesman	June 22, 1869	Sept. 16
COOK, WILL MARION, U.S. Negro composer	1869?	July 19
CROSMAN, HENRIETTA, U.S. actress	Sept. 2, 1870	Oct. 31
DAFOE, JOHN WESLEY, Canadian editor, journalist	Mar. 8, 1866	Jan. 9
DALLIN, CYRUS EDWIN, U.S. sculptor	Nov. 22, 1861	Nov. 14
DAVENPORT, CHARLES BENEDICT, U.S. zoologist	June 1, 1866	Feb. 18
DAVIES, DAVID DAVIES, 1ST BARON, OF LLANDINAM, British M.P.	May 11, 1880	June 16?
DAVIS, HENRY HAGUE, Canadian judge	Sept. 10, 1885	June 30
DAVIS, NORMAN HEZEKIAH, U.S. banker, diplomat	Aug. 9, 1878	July 2
DAWSON, GEORGE GEOFFREY, British journalist	1874	Nov. 7
DIETL, EDUARD, German army officer	1890	July (?)
DILL, SIR JOHN GREER, British army officer	Dec. 25, 1881	Nov. 4
DINEHART, ALAN, U.S. actor	Oct. 3, 1890	July 17
DOLLMANN, FRIEDRICH, German army officer	1882?	June 30?
EASTMAN, JOSEPH BARTLETT, U.S. government official	June 26, 1882	Mar. 15
EBOUE, ADOLPHE FÉLIX SYLVESTRE, French colonial officer	Dec. 26, 1884	May 17
EDDINGTON, SIR ARTHUR STANLEY, British astronomer	Dec. 28, 1882	Nov. 22
FALL, ALBERT BACON, U.S. politician, lawyer	Nov. 26, 1861	Nov. 30
FAUST, FREDERICK (MAX BRAND), U.S. novelist	May 29, 1893	May 12
FERGUSON, JAMES EDWARD, U.S. politician	Aug. 31, 1871	Sept. 21
FERRERO, GINA LOMBROSO, Italian author, sociologist	1871?	Mar. 29
FULMER, HAMPTON PITTS, U.S. politician	June 23, 1875	Oct. 19
GANDHI, MRS. MOHANDAS KARAMCHAND, wife of Indian leader	1870?	Feb. 22?
GAYDA, VIRGINIO, Italian politician and journalist	Aug. 12, 1885	Mar. 14
GEROULD, KATHARINE FULLERTON, U.S. writer	Feb. 6, 1879	July 27
GIBSON, CHARLES DANA, U.S. artist, illustrator	Sept. 14, 1867	Dec. 23
GIRAUDOUX, HIPPOLYTE JEAN, French author, diplomatist	Oct. 29, 1882	Jan. 31
GOODE, SIR WILLIAM (ATHELSTANE MEREDITH), British relief administrator	1875?	Dec. 14
GUEDALLA, PHILIP, British author	Mar. 12, 1889	Dec. 16
HANNA, EDWARD JOSEPH, U.S. clergyman	July 21, 1860	July 10
HANOTAUX, ALBERT AUGUSTE GABRIEL, French statesman and historian	Nov. 19, 1853	Apr. 11
HARDINGE OF PENSHURST, CHARLES HARDINGE, 1ST BARON, British diplomat and statesman	June 20, 1858	Aug. 2
HENRIOT, PHILIPPE, French politician	1889?	June 28
HODŽA, MILAN, Czechoslovak statesman	1878	June 27
HOKE, MICHAEL, U.S. surgeon	June 28, 1874	Sept. 24
HOOVER, LOU HENRY (MRS. HERBERT HOOVER), wife of former U.S. president	1875?	Jan. 7

Alexis Carrel (1873-1944); Sir Arthur Stanley Eddington (1882-1944); Romain Rolland (1866-1944); Hendrik Willem Van Loon (1882-1944)

Name	Birth date	Death date
JANSON, PAUL ÉMILE, Belgian politician, lawyer	1870?	July 4?
JASTROW, JOSEPH, U.S. psychologist, author	Jan. 30, 1863	Jan. 8
JESSUP, WALTER ALBERT, U.S. educator	Aug. 12, 1877	July 7
JORDANA Y SOUZA, FRANCISCO GÓMEZ, Spanish army officer and politician	1876	Aug. 3
KLUGE, GUENTHER VON, German army officer	Oct. 30, 1882	Aug. 31?
KNOX, (WILLIAM) FRANKLIN, U.S. publisher, politician, soldier	Jan. 1, 1874	Apr. 28
KOGA, MINEICHI, Japanese naval officer	Sept. 1885	Mar. 31
LANDIS, KENESAW MOUNTAIN, U.S. judge, baseball commissioner	Nov. 20, 1866	Nov. 25
LANGDON, HARRY, U.S. actor	June 15, 1884	Dec. 22
LEACOCK, STEPHEN BUTLER, Canadian author, economist	Dec. 30, 1869	Mar. 28
LECOINTE, SADI, French pioneer airman	(?)	July 17?
LEIGH-MALLORY, SIR TRAFFORD, British air officer	July 11, 1892	Nov. 17?
LEONARD, WILLIAM ELLERY, U.S. educator, poet	Jan. 25, 1876	May 2
LHEVINNE, JOSEF, U.S. pianist	Dec. 14, 1874	Dec. 2
LINCOLN, JOSEPH CROSBY, U.S. author	Feb. 13, 1870	Mar. 10
LLOYD, LOLA MAVERICK, U.S. pacifist, feminist	Nov. 24, 1875	July 25
LONSDALE, HUGH CECIL LOWTHER, 5TH EARL OF, British sportsman and peer	Jan. 25, 1857	Apr. 13
LUTYNES, SIR EDWIN LANDSEER, British architect	Mar. 29, 1869	Jan. 1
MACHADO, BERNADINO, Portuguese statesman	July 28, 1851	Apr. 29
McMURTRIE, DOUGLAS CRAWFORD, U.S. typographer	July 20, 1888	Sept. 29
McNAIR, LESLEY JAMES, U.S. army officer	May 25, 1883	July 25
McNARY, CHARLES LINZA, U.S. politician, senator	June 12, 1874	Feb. 25
McPHERSON, AIMEE SEMPLE, U.S. evangelist	Oct. 9, 1890	Sept. 27
MAGLIONE, LUIGI, Italian cardinal	Mar. 2, 1877	Aug. 22
MAGNI, ALESSIO, Italian clergyman	1872?	Apr. 13
MAILLOL, ARISTIDE, French sculptor	1861	Oct. 5
MARINETTI, FILIPPO TOMMASO, Italian writer	Dec. 22, 1876	Dec. 2
MAYHEW, KATE, U.S. actress	1853?	June 16
MILLER, GLENN, U.S. orchestra leader	1909?	Dec. 15
MONDRIAN, PIET (PIETER CORNELIS MONDRIAAN), Dutch painter	Mar. 7, 1872	Feb. 1
MONEY, SIR LEO GEORGE CHIOZZA, British author, economist	June 13, 1870	Sept. 25
MOYNE, WALTER EDWARD GUINNESS, 1ST BARON, OF BURY ST. EDMUNDS, British diplomatist	1880	Nov. 6
MULOCK, SIR WILLIAM, Canadian statesman, jurist	Jan. 19, 1844	Oct. 1
MUNCH, EDWARD, Norwegian artist	Dec. 12, 1863	Jan. 25
NAGUMO, CHUICHI, Japanese naval officer	Mar. 1887	July 7
NICHOLS, ROBERT MALISE BOWYER, British poet, author	Sept. 6, 1893	Dec. 17
NORRIS, GEORGE WILLIAM, U.S. legislator	July 11, 1861	Sept. 2
O'CONNELL, WILLIAM HENRY, U.S. cardinal	Dec. 8, 1859	Apr. 22
O'DUFFY, EOIN, Irish military leader	Oct. 30, 1892	Nov. 30
O'NEILL, ROSE CECIL, U.S. artist	1875?	Apr. 6
PALÉOLOGUE, MAURICE GEORGES, French diplomat and writer	Jan. 13, 1859	Nov. 21?
PARK, ROBERT EZRA, U.S. sociologist	Feb. 14, 1864	Feb. 7
PARKER, LOUIS NAPOLEON, British dramatist, composer	Oct. 21, 1852	Sept. 22
POIRET, PAUL, French clothes stylist	1880	Apr. 30?
PRATT, JAMES BISSETT, U.S. philosopher, educator	June 22, 1875	Jan. 15





Wendell Willkie (1892-1944); Theodore Dreiser (1871-1945);
Adolf Hitler (1889-1945); Jerome Kern (1885-1945)

Name	Birth date	Death date
QUEZON, MANUEL LUIS, Philippine statesman	Aug. 19, 1878	Aug. 1
QUILLER-COUCH, SIR ARTHUR THOMAS, British author	Nov. 21, 1863	May 12
REED, JAMES A., U.S. politician	Nov. 9, 1861	Sept. 8
REID, HARRY FIELDING, U.S. geologist	May 18, 1859	June 18
RIZA KHAN PAHLAVI, former shah of Iran	Mar. 15, 1877	July 26
ROBINSON, WILLIAM HEATH, British artist	May 31, 1872	Sept. 13
ROLLAND, ROMAIN, French author	Jan. 29, 1866	Dec. 30
ROMMEL, ERWIN, German army officer	Nov. 15, 1891	Oct. 15?
ROOSEVELT, THEODORE, JR., U.S. army officer	Sept. 13, 1887	July 12
SAINT EXUPÉRY, ANTOINE DE, French aviator, author	1900	Aug. 9?
SERGEI (IVAN NIKOLAEVICH STRAGORODSKY), Russian ecclesiast	1867	May 15
SIMMS, RUTH HANNA McCORMICK, U.S. politician	Mar. 27, 1880	Dec. 31
SMETONA, ANTANAS, Lithuanian statesman	Aug. 10, 1874	Jan. 9
SMITH, ALFRED EMANUEL, U.S. politician	Dec. 30, 1873	Oct. 4
SMITH, ELLISON DURANT ("COTTON ED"), U.S. politician	Aug. 1, 1864	Nov. 17
SMYTH, DAME ETHEL MARY, British composer	Apr. 23, 1858	May 8
STEINACH, EUGEN, Austrian endocrinologist	Jan. 27, 1862	May 14
STEPHENS, WILLIAM DENNISON, U.S. lawyer, politician	Dec. 26, 1859	Apr. 25
SUETSUGU, NOBUMASA, Japanese naval officer	June 1880	Dec. 29?
SVINHUFUD, PEHR EYVIND, Finnish statesman	1861	Feb. 29?
TARBELL, IDA MINERVA, U.S. author	Nov. 5, 1857	Jan. 6
TEMPLE, WILLIAM, British divine	Oct. 15, 1881	Oct. 26
THAELMANN, ERNST, German politician	1886	Aug. 28?
TJETTJENS, EUNICE, U.S. writer, lecturer	July 29, 1884	Sept. 6
TOYAMA, MITSURU, Japanese terrorist leader	Apr. 18, 1855	Oct. 4
VAN LOON, HENDRIK WILLEM, Dutch-born author, historian	Jan. 14, 1882	Mar. 11
VAN NUYS, FREDERICK, U.S. politician	Apr. 16, 1874	Jan. 25
VATUTIN, NIKOLAI FEDOROVICH, Russian army officer	Dec. 16, 1900	Apr. 14
VELEZ, LUPE, Mexican actress	July 18, 1910	Dec. 14
WADE, LANCE, U.S. air officer	1916?	Jan. 19?
WALKER, FREDERIC JOHN, British naval officer	June 3, 1896	July 8
WANG CHING-WEI, Chinese politician	1885?	Nov. 10
WHITE, WILLIAM ALLEN, U.S. journalist, editor	Feb. 10, 1868	Jan. 29
WILLIAMS, EDWARD HUNTINGTON, U.S. physician, author	Nov. 1, 1868	June 24
WILLKIE, WENDELL LEWIS, U.S. politician, business executive	Feb. 18, 1892	Oct. 8
WINGATE, ORDE CHARLES, British army officer	Feb. 26, 1903	Mar. 24
WITZLEBEN, ERWIN JOB WILHELM GEORG ERDMANN, VON, German army officer	Dec. 4, 1881	Aug. 8
WOOD, SIR HENRY JOSEPH, British conductor, musician	Mar. 3, 1869	Aug. 19
WRIGHT, HAROLD BELL, U.S. author	May 4, 1872	May 24
YEATS-BROWN, FRANCIS, British author, army officer	Aug. 15, 1886	Dec. 19
ZIMMERMAN, JAMES FULTON, U.S. educator	Sept. 11, 1887	Oct. 20

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ADAMS, HERBERT, U.S. sculptor	Jan. 28, 1858	May 21
AINLEY, HENRY HINCHLIFFE, British actor	Aug. 21, 1879	Oct. 31
ARGENTINITA (ENCARNACIÓN LOPEZ), Spanish dancer	Mar. 25, 1905	Sept. 24
ASTON, FRANCIS WILLIAM, British scientist	Sept. 1, 1877	Nov. 21?

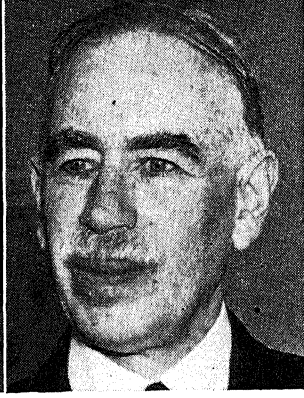
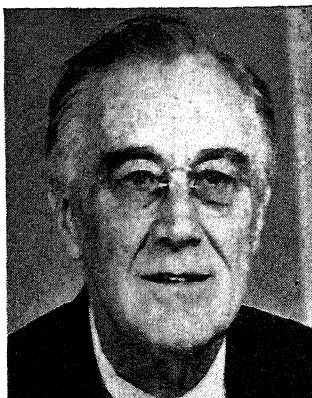
Name	Birth date	Death date
AVILA CAMACHO, MAXIMINO, Mexican politician and army officer	Aug. 1893	Feb. 17
BACON, SIR HICKMAN BECKETT, premier baronet of England	Apr. 14, 1855	Apr. 13
BAKER, SARA JOSEPHINE, U.S. child hygiene expert	Nov. 15, 1873	Feb. 22
BARBIER, GEORGE, U.S. actor	1865?	July 19
BARTÓK, BÉLA, Hungarian composer	Mar. 25, 1881	Sept. 26
BASCOM, FLORENCE, U.S. geologist, educator	July 14, 1862	June 18
BASILONE, JOHN, U.S. marine	1918?	Feb. 19
BEER-HOFMANN, RICHARD, Austrian poet and playwright	July 11, 1866	Sept. 26
BELLAMANN, HENRY, U.S. author, musician	Apr. 28, 1882	June 16
BENAVIDES, OSCAR R., Peruvian army officer, politician	1876	July 2
BENCHLEY, ROBERT CHARLES, U.S. humorist	Sept. 15, 1889	Nov. 21
BENDIX, VINCENT, U.S. engineer, inventor	1882	Mar. 27
BERZARIN, NIKOLAI Y., Russian army officer	1904?	June 18
BIBESCO, PRINCESS ELIZABETH, British author	1897	Apr. 7
BOCK, FEDOR VON, German army officer	Dec. 3, 1880	May 6?
BONG, RICHARD IRA, U.S. air officer	Sept. 24, 1920	Aug. 6
BORMANN, MARTIN, German politician	June 17, 1900	April 30?
BOSE, SUBHAS CHANDRA, Indian politician	1897?	Aug. 19
BOVARD, OLIVER KIRBY, U.S. newspaper editor	1872?	Nov. 3
BRANDEIS, ALICE GOLDMARK, U.S. suffragist	1866?	Oct. 11
BRYAN, CHARLES WAYLAND, U.S. politician	Feb. 10, 1867	Mar. 4
BUCKNER, SIMON BOLIVAR, JR., U.S. army officer	July 18, 1886	June 18
BURGIN, EDWARD LESLIE, British politician	July 13, 1887	Aug. 15
BUSCH, ERNST, German army officer	July 6, 1885	July 17
BYAS, HUGH, British newspaperman	1874?	Mar. 6
CABOT, HUGH, U.S. surgeon, educator	Aug. 11, 1872	Aug. 14
CALDER, ALEXANDER STIRLING, U.S. sculptor	Jan. 11, 1870	Jan. 6
CALLES, PLUTARCO ELÍAS, Mexican statesman, military leader	Sept. 25, 1877	Oct. 19
CAMERON, SIR DAVID YOUNG, British etcher, painter	June 28, 1865	Sept. 16
CANNON, WALTER BRADFORD, U.S. physiologist	Oct. 19, 1871	Oct. 1
CASSEL, GUSTAV, Swedish economist	Oct. 20, 1866	Jan. 14
CASSIRER, ERNST, German philosopher	July 28, 1874	Apr. 13
CHAUVEL, SIR HENRY GEORGE, Australian army officer	Apr. 16, 1865	Mar. 4
CHERNYAKHOVSKY, IVAN DANILOVICH, Russian army officer	1907?	Feb. 18
CLARK, BRUCE LAWRENCE, U.S. paleontologist	May 29, 1880	Sept. 24
CLARKE, JOHN HESSIN, U.S. jurist	Sept. 18, 1857	Mar. 22
CLENDENING, LOGAN, U.S. physician, writer	May 25, 1884	Jan. 31
CONDON, JOHN F. ("JAFSIE"), U.S. educator	1860?	Jan. 2
CRAIG, MALIN, U.S. army officer	Aug. 5, 1875	July 25
CRAVEN, FRANK, U.S. actor	1880	Sept. 1
CRET, PAUL PHILIPPE, U.S. architect	Oct. 23, 1876	Sept. 8
CREWE, ROBERT OFFLEY ASHBURTON CREWE-MILNES, 1ST MARQUESS OF, British statesman, writer	Jan. 12, 1858	June 20
CROW, (HERBERT) CARL, U.S. author	Sept. 26, 1883	June 8
CURTIN, JOHN, Australian statesman	Jan. 8, 1885	July 5
DARBY, WILLIAM ORLANDO, U.S. army officer	Feb. 8, 1911	May 1?
DAVIS, DWIGHT FILLEY, U.S. politician, cabinet member	July 5, 1879	Nov. 28
DE FOREST, ALFRED VICTOR, U.S. engineer	Apr. 7, 1888	Apr. 5

Name	Birth date	Death date
DELAND, MARGARETTA WADE (CAMPBELL), U.S. writer	Feb. 23, 1857	Jan. 13
DENNY, HAROLD NORMAN, U.S. war correspondent	Mar. 11, 1889	July 3
DENTZ, HENRI-FERNAND, French army officer	Dec. 12, 1881	Dec. 13 1888
DORIOT, JACQUES, French politician	July 24, 1869	Aug. 22 1891?
DORMUELLER, JULIUS HEINRICH, German transportation expert, politician	July 24, 1869	Aug. 22 1891?
DOSTLER, ANTON, German army officer	July 24, 1869	Aug. 22 1891?
DOUGLAS, LORD ALFRED (BRUCE), British author and poet	Oct. 22, 1870	Mar. 20
DREISER, THEODORE, U.S. author	Aug. 27, 1871	Dec. 28
EASLEY, CLAUDIUS MILLER, U.S. army officer	July 11, 1891	June 19
EDWARDS, GUS, U.S. song writer	Aug. 18, 1881	Nov. 7
ELLES, SIR HUGH JAMIESON, British army officer	Apr. 27, 1880	July 11 1883?
EVANS, CARADOC, British novelist	1875?	Nov. 28
FAIRFAX, BEATRICE (MARIE MANNING GASCH), U.S. columnist	1875	June 30
FINLAY, WILLIAM FINLAY, 2ND VISCOUNT, OF NAIRN, British jurist	July 27, 1881	Apr. 6?
FISCHER, HANS, German chemist	Nov. 29, 1849	Apr. 19
FLEMING, SIR (JOHN) AMBROSE, British physicist	Feb. 24, 1865	May 3
FLEXNER, BERNARD, U.S. lawyer	Nov. 27, 1889	Apr. 8
FRASER, LEON, U.S. banker	July 15, 1895	May 23
FRIEDBURG, HANS GEORG VON, German naval officer	Jan. 7, 1883	Sept. 13
GAY, MAISIE, British actress	May 18, 1893	Aug. 10
GAYFORD, OSWALD ROBERT, British air force officer	Apr. 22, 1874	Nov. 21
GLASGOW, ELLEN (ANDERSON GHOLSON), U.S. author	Oct. 9, 1886	July 8
GLASS, POWELL, U.S. journalist	Oct. 5, 1882	Aug. 10
GODDARD, ROBERT H., U.S. physicist	Oct. 29, 1897	May 3?
GOEBBELS, JOSEF, German propaganda chief	Nov. 22, 1856	May 14
GRANT, HEBER J., U.S. cleric	1882	May 24
GREEN, FLORENCE TOPPING, U.S. artist	1872	June 27
HÁCHA, EMIL, Czechoslovak statesman	July 5, 1875	Feb. 7?
HAGENBECK, HEINRICH, German zoologist	1866?	June 25
HARMON, CLIFFORD B., U.S. aviation pioneer	Jan. 19, 1888	Feb. 26?
HARMON, MILLARD FILLMORE, U.S. army air officer	June 10, 1856	Mar. 19
HAZARD, CAROLINE, U.S. educator	Sept. 13, 1857	Oct. 13
HERSHEY, MILTON SNAVELY, U.S. confectioner and philanthropist	Nov. 7, 1900	May 23
HIMMLER, HEINRICH, German politician	Apr. 20, 1889	May 1?
HITLER, ADOLF, German statesman	Apr. 8, 1859	Apr. 11
HOLGATE, THOMAS FRANKLIN, U.S. educator, mathematician	Feb. 20, 1860	Feb. 6
HOWELL, WILLIAM HENRY, U.S. physiologist, educator	Dec. 7, 1872	Mar. 22?
HUIZINGA, JOHAN, Netherlands historian, educator	1896	Dec. 30
HUNTER, GLENN, U.S. actor	Feb. 6, 1859	Jan. 4
JIMÉNEZ OREAMUNO, RICARDO, Costa Rican statesman	Sept. 2, 1866	Aug. 6
JOHNSON, HIRAM WARREN, U.S. politician	Mar. 25, 1862	Feb. 2
JOHNSON, WILLIAM EUGENE ("PUSSY-FOOT"), U.S. prohibitionist	Nov. 25, 1878	June 5
KAISER, GEORG, German playwright	Mar. 1, 1891	Mar. 18
KALISH, MAX, U.S. sculptor	Jan. 27, 1885	Nov. 11
KERN, JEROME DAVID, U.S. composer	Oct. 19, 1859	Feb. 3
KERNAN, FRANCIS JOSEPH, U.S. army officer	Oct. 4, 1872	Dec. 26
KEYES, ROGER JOHN BROWNLOW KEYES, 1ST BARON, OF ZEEBRUGGE AND DOVER, British naval officer	Apr. 4, 1896	Nov. 11
KIEFER, DIXIE, U.S. naval officer		

Name	Birth date	Death date
KNOBLOCK, EDWARD, British playwright	Apr. 7, 1874	July 19
KONYE, FUMIMARO, Japanese prince and statesman	Oct. 1891	Dec. 16
LAKE, SIMON, U.S. naval architect, mechanical engineer	Sept. 4, 1866	June 23
LALIQUE, RENÉ, French artist and designer	Apr. 6, 1860	May 9
LANG, COSMO GORDON LANG, 1ST BARON, OF LAMBETH, Anglican divine	Oct. 31, 1864	Dec. 5
LAVAL, PIERRE, French politician	June 28, 1883	Oct. 15
LEA, LUKE, U.S. senator, newspaper publisher	Apr. 12, 1879	Nov. 18
LEE, WILLIS AUGUSTUS, JR., U.S. naval officer	May 11, 1888	Aug. 25
LEY, ROBERT, German politician	Feb. 15, 1890	Oct. 25
LINDSAY, SIR RONALD, British diplomat	May 3, 1877	Aug. 21
LLOYD GEORGE OF DWYFOR, DAVID	Jan. 17, 1863	Mar. 26
LLOYD GEORGE, EARL, British statesman	Sept. 22, 1875	July 23
LYMAN, CHARLES HUNTINGTON, U.S. marine corps officer	Aug. 9, 1884	Sept. 6
McCAIN, JOHN SIDNEY, U.S. naval officer	June 12, 1884	Sept. 16
McCORMACK, JOHN, U.S. tenor	Dec. 6, 1849	Nov. 8
MACKENSEN, AUGUST VON, German field marshal	1888	Feb. 24
MAHER PASHA, AHMED, Egyptian jurist, politician	June 26, 1879	July 3
MANSON, JAMES BOLIVAR, British painter	1859	June 7
MARRIOTT, SIR JOHN ARTHUR RANSOME, British historian	Sept. 7, 1863	Aug. 2
MASCAGNI, PIETRO, Italian composer	?	June 14
MATHER, WINIFRED HOLT, U.S. sculptress, writer, philanthropist	Oct. 20, 1869	Oct. 30
MERRIAM, JOHN CAMPBELL, U.S. palaeontologist	Sept. 25, 1866	Dec. 4
MORGAN, THOMAS HUNT, U.S. biologist	June 12, 1885	Mar. 3
MOSES, JOHN, U.S. politician	Apr. 21, 1860	Jan. 23
MURRAY, SIR ARCHIBALD, British army officer	July 29, 1883	Apr. 28
MUSSOLINI, BENITO, Italian politician	June 4, 1879	July 13
NAZIMOVA, ALLA, U.S. actress	Apr. 23, 1881	July 25
NORRIS, CHARLES GILMAN, U.S. novelist	1902	Jan. 25
OUAMANSKY, KONSTANTIN ALEXANDROVICH, Russian diplomat	1864?	July 28
OXFORD AND ASQUITH, MARGOT, COUNTESS OF, British writer	Oct. 11, 1861	Aug. 9
PARTRIDGE, SIR BERNARD, British artist	Nov. 23, 1889	Nov. 21
PATCH, ALEXANDER MCCARRELL, JR., U.S. army officer	Jan. 11, 1894	Mar. 15?
PATRICK, EDWIN DAVIES, U.S. army officer	Oct. 25, 1866	Jan. 16
PATTEN, GEORGE WILLIAM (GILBERT) (BURT L. STANDISH), U.S. author	Nov. 11, 1885	Dec. 21
PATTON, GEORGE SMITH, JR., U.S. army officer	July 22, 1872	Jan. 26
PENDERGAST, THOMAS JOSEPH, U.S. politician	Apr. 10, 1883	Feb. 1
PHILOFF (or PHILOV), BOGDAN DIMITROV, Bulgarian politician	Oct. 27, 1875	Aug. 13
PHIPPS, SIR ERIC (CLARE EDMUND), British diplomat	Aug. 3, 1900	Apr. 18
PYLE, ERNEST TAYLOR, U.S. newspaperman	July 18, 1887	Oct. 24
QUISLING, VIDKUN ABRAHAM, Norwegian politician	1873	Apr. 30
RANDALL-MacGIVER, DAVID, British archaeologist, anthropologist	June 4, 1891	June 26
RAPEE, ERNO, U.S. orchestra conductor	Jan. 30, 1882	Apr. 12
ROOSEVELT, FRANKLIN DELANO, U.S. president	Feb. 22, 1866	July 31
RORKE, KATE, British actress	Nov. 26, 1899	Mar. 30
ROSE, MAURICE, U.S. army officer	Jan. 29, 1872	Feb. 14
ROTHENSTEIN, SIR WILLIAM, British artist	Feb. 10, 1893	June 18
ROYAL, FORREST, U.S. naval officer		

David Lloyd George (1863-1945); Benito Mussolini (1883-1945);
George S. Patton, Jr. (1885-1945); Ernie Pyle (1900-1945)





Franklin D. Roosevelt (1882-1945); John Joseph Glennon (1862-1946); John Maynard Keynes (1883-1946); Harlan F. Stone (1872-1946)

Name	Birth date	Death date
RUPERTUS, WILLIAM HENRY, U.S. marine corps officer	Nov. 14, 1889	Mar. 25
SALTEN, FELIX, German writer	Sept. 6, 1869	Oct. 8
SEABROOK, WILLIAM BUEHLER, U.S. author, explorer	Feb. 22, 1886	Sept. 20
SERÉDI, JUSTINIAN GEORGE, Hungarian cardinal	Apr. 23, 1884	Apr. 13? 1876?
SERT, JOSÉ MARIA, Spanish mural painter		Nov. 27
SHAPOSHNIKOV, BORIS MIKHAILOVICH, Russian army officer	Oct. 4, 1882	Mar. 26
SHEAR, THEODORE LESLIE, U.S. archaeologist	Aug. 11, 1880	July 3
SHEEHAN, WINFIELD R., U.S. motion picture producer	Sept. 24, 1883	July 25
SIMONS, MOISES, Cuban composer	1889?	June 28
SPERRY, EDWARD GOODMAN, U.S. industrialist	1891?	Nov. 6
SYMONS, ARTHUR, British poet and critic	Feb. 28, 1865	Jan. 22
SZOLD, HENRIETTA, U.S. Zionist leader	Dec. 21, 1860	Feb. 13
TARDIEU, ANDRÉ PIERRE GABRIEL AMÉDÉE, French politician, writer	Sept. 22, 1876	Sept. 15
TERBOVEN, JOSEF, German politician	May 23, 1898	May 9
TOLSTOY, ALEXEI NIKOLAYEVICH, Russian novelist, dramatist	1883	Feb. 23
TRAIN, ARTHUR, U.S. novelist	Sept. 6, 1875	Dec. 22
TROUBETZKOY, PRINCESS, AMELIE RIVES, U.S. author	Aug. 23, 1863	June 15
VALÉRY, PAUL, French poet	Oct. 30, 1871	July 20
VAN ANDA, CARR VATTEL, U.S. newspaper editor	Dec. 2, 1864	Jan. 28
WATSON, EDWIN MARTIN, U.S. army officer	Dec. 10, 1883	Feb. 20
WERFEL, FRANZ, German writer	Sept. 10, 1890	Aug. 26
WITOS, WINCENTY, Polish statesman, politician	1874	Oct. 31
WOOLSEY, JOHN MUNRO, U.S. jurist	Jan. 3, 1877	May 4
WYETH, NEWELL CONVERS, U.S. artist, illustrator	Oct. 22, 1882	Oct. 19
YOUNG, HUGH HAMPTON, U.S. surgeon	Sept. 18, 1870	Aug. 23
ZIWER PASHA, AHMED, Egyptian statesman	Nov. 14, 1864	Aug. 21
ZULOAGA, IGNACIO, Spanish painter	July 26, 1870	Oct. 31

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ALBERT, ERNEST, U.S. landscape painter	1857?	Mar. 25
ALEKHINE, ALEXANDER, French chess champion	Nov. 1, 1892	Mar. 24
ALEXANDROV, ALEXANDER VASSILIEVICH, Russian composer	1884	July 8
ALLEN, SIR HUGH PERCY, British musician	Dec. 23, 1869	Feb. 20
ANANDA MAHIDOL, king of Siam	Sept. 20, 1925	June 9
ANDREWS, CHARLES OSCAR, U.S. politician	1877?	Sept. 18
ANTONESCU, ION, Rumanian soldier, statesman	June 2, 1882	June 1
ARLISS, GEORGE, British actor	Apr. 10, 1868	Feb. 5
AROSEMENA, CARLOS CONSTANTINO, Panamanian patriot	1868?	July 11
ARTHUR, SIR GEORGE (COMPTON ARCHIBALD), British biographer	Apr. 30, 1860	Jan. 14
AYRES, LEONARD PORTER, U.S. economist	Sept. 15, 1879	Oct. 29
BAGLEY, WILLIAM CHANDLER, U.S. educator, editor	Mar. 15, 1874	July 1
BAILEY, JOSIAH WILLIAM, U.S. politician	Sept. 14, 1873	Dec. 15
BAILEY, THOMAS L., U.S. politician	Jan. 6, 1888	Nov. 2
BAIRD, JOHN LOGIE, British inventor	Aug. 13, 1888	June 14
BAKER, RAY STANNARD ("DAVID GRAYSON"), U.S. biographer	Apr. 17, 1870	July 12
BALDWIN, LEWIS WARRINGTON, U.S. railroad executive	Feb. 26, 1875	May 14
BANKHEAD, JOHN HOLLIS, U.S. politician	July 8, 1872	June 12
BANNERMAN, HELEN, British author	(?)	Oct. 13
BANTA, ARTHUR MANGUN, U.S. zoologist	Dec. 31, 1877	Jan. 2
BANTOCK, SIR GRANVILLE, British composer	Aug. 7, 1868	Oct. 16
BARBOUR, THOMAS, U.S. naturalist	Aug. 19, 1884	Jan. 8

Name	Birth date	Death date
BARTLETT, ROBERT ABRAM, U.S. explorer	Aug. 15, 1875	Apr. 28
BARTON, JOHN, U.S. actor	1877	Dec. 23
BATEMAN, HARRY, British mathematician	May 29, 1882	Jan. 21
BATES, SIR PERCY ELLY, British shipping magnate	May 12, 1879	Oct. 16
BEARD, MARY, U.S. nurse	Nov. 14, 1876	Dec. 4
BEATTIE, SIR (JOHN) CARRUTHERS, British scientist	Nov. 21, 1866	Sept. 10
BEERY, NOAH, U.S. actor	Jan. 17, 1884	Apr. 1
BELLANCA, DOROTHY J., U.S. labour leader	1894?	Aug. 16
BERL, ERNST, U.S. chemist	July 7, 1877	Feb. 16
BERMAN, LOUIS, U.S. endocrinologist	Mar. 15, 1893	May 16
BLOMBERG, WERNER VON, German army officer	Sept. 2, 1878	Mar. 13
BOARDMAN, MABEL THORP, U.S. welfare worker	1860?	Mar. 17
BOETTO, PIETRO, Italian cardinal	May 19, 1871	Jan. 31
BOGOMOLETS, ALEXANDER ALEXANDROVITCH, Russian biologist	1881	July 19
BOND, CARRIE JACOBS, U.S. composer	Aug. 11, 1862	Dec. 28
BOWES, EDWARD, U.S. radio showman	June 14, 1874	June 13
BOYD, ERNEST, U.S. author	June 28, 1887	Dec. 30
BOYNTON, PERCY HOLMES, U.S. educator	Oct. 30, 1875	July 8
BRADLEY, EDWARD RILEY, U.S. turfman	1859?	Aug. 15
BRAGDON, CLAUDE, U.S. architect	Aug. 1, 1866	Sept. 17
BROOKE, C. F. TUCKER, U.S. educator	1883?	June 22
BROWN, LADY (RICHMOND) LILIAN, British explorer	1883?	Oct. 4
BROWNE, GEORGE ELMER, U.S. artist	May 6, 1871	July 13
BRUCE, JAMES DEACON, U.S. physician	Oct. 4, 1872	Sept. 5
BRUCE, WILLIAM CABELL, U.S. senator, author	Mar. 12, 1860	May 9
BUCKLAND, WILLIAM WARWICK, British educator	1859	Jan. 16
BUDD, EDWARD GOWEN, U.S. industrialist	Dec. 28, 1870	Nov. 30
BUELL, RAYMOND LESLIE, U.S. editor, writer, educator	July 13, 1896	Feb. 20
BURDENKO, NIKOLAI H. C., Russian surgeon	1878	Nov. ?
BURKHART, HARVEY J., U.S. dentist	1861?	Sept. 22
BUSCH, ADOLPHUS 3rd, U.S. industrialist	1891?	Aug. 29
BUTTERWORTH, CHARLES EDWARD, U.S. actor	1897	June 13
CACCIA DOMINIONI, CAMILLO, Italian cardinal	1877	Nov. 12
CADMAN, CHARLES WAKEFIELD, U.S. composer	Dec. 24, 1881	Dec. 30
CALLENDER, SIR GEOFFREY ARTHUR ROMAINE, British naval historian	1875	Nov. 6
CALZA, GUIDO, Italian archaeologist	Apr. 21, 1888	Apr. 17
CARR, ALEXANDER, U.S. actor	Mar. 7, 1878	Sept. 19
CARTIER DE MARCHIENNE, BARON EMILE DE, Belgian diplomat	Nov. 30, 1871	May 10
CAVAN, 10TH EARL OF, FREDERIC RUDOLPH LAMBART, British army officer	Oct. 16, 1865	Aug. 28
CHAPPAIS, SIR (JOSEPH AMABLE) THOMAS, Canadian statesman	Mar. 23, 1858	July 15
CLAPHAM, SIR JOHN H., British historian	1873	Mar. 29
CORTÉS CASTRO, LEÓN, Costa Rican statesman	Dec. 8, 1882	Mar. 3
COWLES, GARDNER, U.S. publisher	Feb. 28, 1861	Feb. 28
CROWE, FRANCIS TRENHOLM, U.S. engineer	Oct. 12, 1882	Feb. 26
CULLEN, COUNTTEE, U.S. Negro poet	May 30, 1903	Jan. 9
CUNLIFFE, JOHN WILLIAM, U.S. educator, author	Jan. 20, 1865	Mar. 18
CURRY, JOHN STEUART, U.S. artist	Nov. 14, 1897	Aug. 29
DANDY, WALTER EDWARD, U.S. surgeon	Apr. 6, 1886	Apr. 19
DAVEY, MARTIN L., U.S. politician	July 25, 1884	Mar. 31
DAVIES, DAVID PERCY, British newspaper editor	Oct. 25, 1891	Oct. 15

Name	Birth date	Death date
DEALEY, GEORGE BANNERMAN, U.S. publisher	Sept. 18, 1859	Feb. 26 1885?
DE LA ROCQUE, FRANCOIS, French politician	1885?	Apr. 28 1874?
DESPIAU, CHARLES, French sculptor	1874?	Oct. 30
DION, MARQUIS ALBERT DE, French industrialist	1856	Aug. 20
DIXON, THOMAS, U.S. author	Jan. 11, 1864	Apr. 3
DONAHEY, VICTOR, U.S. politician	July 7, 1873	Apr. 8
DONALD, WILLIAM HENRY, Australian politician and journalist	1875?	Nov. 9
DOVE, ALBERT G., U.S. painter	1880?	Nov. 23
DRUMMOND-HAY, LADY GRACE MARGUERITE HAY, British journalist, aviatrix	1895?	Feb. 12
DUNHILL, THOMAS FREDERICK, British composer	Feb. 1, 1877	Mar. 13
EBY, KERR, U.S. artist	Oct. 19, 1889	Nov. 18
ESSER, JOHANNES FREDERICUS SAMUEL, Dutch plastic surgeon	1878?	Aug. 9
EULOGIUS, METROPOLITAN, archbishop of Russian Orthodox Church in Paris	Apr. 10, 1868	Aug. 8
EUSTIS, DOROTHY HARRISON, U.S. humanitarian	May 30, 1886	Sept. 8
FABER, EBERHARD, U.S. pencil manufacturer	Mar. 14, 1859	May 16
FALLA, MANUEL DE, Spanish composer	Nov. 23, 1876	Nov. 14
FERGUSON, GEORGE HOWARD, Canadian politician	June 18, 1870	Feb. 21
FIELDS, W. C. (CLAUDE WILLIAM DUKENFIELD), U.S. comedian	Jan. 29, 1880	Dec. 25
FLEXNER, SIMON, U.S. pathologist	Mar. 25, 1863	May 2
FOSTER RECABARREN, MANUEL, Chilean lawyer, politician	May 6, 1864	June 11
FRANK, HANS, German jurist, politician	May 3, 1900	Oct. 16
FRANK, KARL HERMANN, German politician	1898	May 22
FRICK, WILHELM, German politician	Mar. 12, 1877	Oct. 16
GAFFEY, HUGH J., U.S. army officer	Nov. 18, 1895	June 16
GALEN, COUNT CLEMENS AUGUST VON, German cardinal	Mar. 16, 1878	Mar. 22
GALLAGHER, WILLIAM J., U.S. politician	May 13, 1875	Aug. 13
GARDINER, ALFRED GEORGE, British author, editor	1865	Mar. 3
GARDINER, JOHN STANLEY, British zoologist	Jan. 24, 1872	Feb. 27
GARNETT, CONSTANCE, British translator	1862?	Dec. 17
GASPARRI, ENRICO, Italian cardinal	July 25, 1871	May 20
GATES, CALEB FRANK, U.S. educator	Oct. 18, 1857	Apr. 9
GAUMONT, LÉON ERNEST, French film producer	May 10, 1864	Aug. 11
GAY, EDWIN FRANCIS, U.S. economist	Oct. 27, 1867	Feb. 8
GLASS, CARTER, U.S. politician	Jan. 4, 1858	May 28
GLENNON, JOHN JOSEPH, U.S. cardinal	June 14, 1862	Mar. 9
GOERING, HERMANN WILHELM, German politician	Jan. 12, 1893	Oct. 15
GORT, 6TH VISCOUNT, JOHN STANDISH SURTEES PRENDERGAST VEREKER, British army officer	July 1886	Mar. 31
GOURAUD, HENRI JOSEPH ÉTIENNE, French army officer	Nov. 17, 1867	Sept. 16
GRANVILLE-BARKER, HARLEY GRANVILLE, British dramatist	Nov. 25, 1877	Aug. 31
GRAY, JOHN HENRY, U.S. economist	Mar. 11, 1859	Apr. 4
GREGG, JAMES EDGAR, U.S. clergyman, educator	Nov. 24, 1875	Feb. 23
GREISER, ARTHUR, German politician	1897	July 21
GRIFFITH-BOSCAWEN, SIR ARTHUR SACKVILLE TREVOR, British statesman	1862	Oct. 3
HACKZELL, ANDERS WERNER ANTTI, Finnish diplomat	Oct. 18, 1865	June 1
HALE, HARRY CLAY, U.S. army officer	1881	Jan. 15
HAMILTON, CLAYTON (MEEKER), U.S. author	July 10, 1861	Mar. 21
HAMILTON, GEORGE E., U.S. educator, lawyer	Nov. 14, 1881	Sept. 17
HANSSON, PER ALBIN, Swedish statesman	Mar. 5, 1855	May 24
HARE, JAMES H., U.S. news photographer	Oct. 28, 1885	Oct. 5
HARRIS, WILLIAM JR., U.S. theatrical producer	Oct. 3, 1856	June 24
HART, WILLIAM S., U.S. actor	July 22, 1884	Sept. 2
HATTON, AUGUSTUS RAYMOND RUTAN, U.S. educator	Dec. 6, 1872	June 23
HAUPTMANN, GERHART, German author	Sept. 27, 1873	Nov. 12
HAUSHOFER, KARL, German geopolitician	Nov. 15, 1862	June 8
HEALY, ROBERT E., U.S. jurist	Aug. 27, 1869	Mar. 10
HEATH, SIR (HENRY) FRANK, British educator	Mar. 25, 1883	Nov. 17
HERTZ, JOSEPH HERMAN, British rabbi	Dec. 11, 1863	Oct. 5
HERTZLER, ARTHUR EMANUEL, U.S. surgeon	Sept. 25, 1872	Jan. 14
HEWETT, EDGAR LEE, U.S. archaeologist	July 26, 1870	Sept. 12
HILL, GEORGE WASHINGTON, U.S. business executive	Nov. 23, 1865	Dec. 31
HILL, PATTY SMITH, U.S. educator	Oct. 22, 1884	Sept. 13
HILLMAN, SIDNEY, U.S. labour leader	Mar. 27, 1868	May 25
HITCHCOCK, CURTICE, U.S. publisher	Mar. 23, 1887	July 10
HOETZSCH, OTTO, German historian	Mar. 4, 1892	May 3
	Feb. 14, 1876	Aug. 27

Name	Birth date	Death date
HOFFMAN, FREDERICK LUDWIG, U.S. statistician	May 2, 1865	Feb. 23 1888?
HOMMA, MASA HARU, Japanese army officer	1888?	Apr. 3
HOPKINS, HARRY LLOYD, U.S. politician	Aug. 17, 1890	Jan. 29
HORMEL, GEORGE ALBERT, U.S. industrialist	Dec. 4, 1860	June 5
HOWARD DE WALDEN, 8TH BARON, THOMAS EVELYN-ELLIS, British peer, author, painter	1880?	Nov. 5
IGLEHART, DAVID STEWART, U.S. shipping executive	Sept. 4, 1873	May 14
IMRÉDY, BELA, Hungarian politician	1891	Feb. 28
INGERSOLL, ERNEST, U.S. naturalist, author	Mar. 13, 1852	Nov. 13
INGLIS, JOHN J., Irish artist	1867?	Sept. 2
INGRAM, ARTHUR FOLEY WINNINGTON, British prelate	Jan. 26, 1858	May 26
JAMES, ALEXANDER, U.S. artist	Dec. 22, 1890	Feb. 28
JEANS, SIR JAMES HOPWOOD, British mathematician	Sept. 11, 1877	Sept. 17
JEFFRIES, MAUD, U.S. actress	Dec. 14, 1880	Sept. 26
JODL, ALFRED, German army officer	1892?	Oct. 16
JOHNSON, ("JACK") JOHN ARTHUR, U.S. boxer	Mar. 31, 1878	June 10
JOHNSON, WALTER, U.S. athlete	Nov. 6, 1887	Dec. 10
JOHNSTON, WILLIAM M. (LITTLE BILL), U.S. tennis champion	1895?	May 1
JONES, GEORGE CLARENCE, Canadian naval officer	Oct. 24, 1895	Feb. 8
JOYCE, WILLIAM (LORD HAW HAW), British fascist	Apr. 24, 1906	Jan. 3
JUDD, CHARLES HUBBARD, U.S. educator	Feb. 20, 1873	July 18
KAFANDARIS, GEORGE, Greek statesman	1873?	Aug. 28
KALININ, MIKHAIL IVANOVICH, Russian statesman	Nov. 20, 1875	June 3
KALTENBRUNNER, ERNST, Austrian politician	1901	Oct. 16
KEANE, RICHARD VALENTINE, Australian politician	1880?	Apr. 26
KEITEL, WILHELM, German army officer	Sept. 22, 1882	Oct. 16
KEYNES, 1ST BARON OF TILTON, JOHN MAYNARD KEYNES, British economist	June 5, 1883	Apr. 21
KEYSERLING, COUNT HERMANN, German philosopher	July 20, 1880	Apr. 26
LANCHESTER, FREDERICK WILLIAM, British engineer	Oct. 23, 1868	Mar. 8
LANDMAN, ISAAC, U.S. rabbi, editor	Oct. 24, 1880	Sept. 3
LANGEVIN, PAUL, French physicist	1872	Dec. 19
LAREDO BRÚ, FEDERICO, Cuban statesman	Apr. 23, 1875	July 7
LARGO CABALLERO, FRANCISCO, Spanish politician	1869	Mar. 23
LAZZERI, ANTHONY MICHAEL ("TONY"), U.S. baseball player	Dec. 6, 1903	Aug. 7
LEIGH, RICHARD HENRY, U.S. naval officer	Aug. 12, 1870	Feb. 4
LEWIS, ETHELREDA, British author	(?)	Aug. 1
LEWIS, GILBERT NEWTON, U.S. scientist	Oct. 23, 1875	Mar. 23
LIBMAN, EMANUEL, U.S. physician	1872	June 28
LIEBERT, ARTHUR, German philosopher	1878	Nov. (?)
LIGGETT, LOUIS KROH, U.S. business executive	Apr. 4, 1875	June 5
LORENZ, ADOLF, Austrian surgeon	Apr. 21, 1854	Feb. 12
LUMSDEN, LESLIE LEON, U.S. public health authority	June 14, 1875	Nov. 8
McCLUNG, CLARENCE ERWIN, U.S. zoologist	Apr. 5, 1870	Jan. 17
McGOVERN, FRANCIS EDWARD, U.S. politician	Jan. 21, 1866	May 17
McRAE, ALEXANDER DUNCAN, Canadian businessman, politician	Nov. 17, 1874	June 26
McREYNOLDS, JAMES CLARK, U.S. jurist	Feb. 3, 1862	Aug. 24
MACURDY, GRACE HARRIET, U.S. educator	(?)	Oct. 23
MANTON, MARTIN THOMAS, U.S. jurist	Aug. 2, 1880	Nov. 17
MARBURG, THEODORE, U.S. publicist	July 10, 1862	Mar. 3
MARKS, JAMES CHRISTOPHER, U.S. organist-composer	July 29, 1863	Oct. 13
MARSTON, SIR CHARLES, British biblical archaeologist	Apr. 6, 1867	May 21
MARTIN, CHARLES HENRY, U.S. army officer, politician	Oct. 1, 1863	Sept. 22
MARTIN, LOUIS, French bacteriologist	1864	June 13
MARX, WILHELM, German statesman	Jan. 15, 1863	Aug. 5
MATSUI, BARON KEISHIRO, Japanese diplomat	Mar. 5, 1868	June 4
MATSUOKA, YOSUKE, Japanese statesman	Mar. 3, 1880	June 27
MAURICE, ARTHUR BARTLETT, U.S. author	Apr. 10, 1873	May 31
MAXTON, JAMES, British politician	June 22, 1885	July 23
MAXWELL, GEORGE HEBARD, U.S. lawyer, erosion expert	June 3, 1860	Dec. 1
MAY, 1ST BARON, OF WEYBRIDGE, GEORGE ERNEST MAY, British insurance executive, government official	June 20, 1871	Apr. 10
MEDALIE, GEORGE ZERDIN, U.S. jurist	Nov. 21, 1883	Mar. 5
MEEK, DONALD, British character actor	July 14, 1880	Nov. 18
MERIVALE, PHILIP, British actor	Nov. 2, 1886	Mar. 13



Sir James Jeans (1877-1946); Gertrude Stein (1874-1946); Booth Tarkington (1869-1946); James J. Walker (1881-1946)

Name	Birth date	Death date
MIKHAILOVITCH, DRAJA, Yugoslav army officer	1893	July 17
MOHOLY-NAGY, LASZLO GYORGY, U.S. painter, designer	July 20, 1895	Nov. 24
MORAN, WILLIAM H., U.S. secret service agent	1864?	Sept. 9
MORGENTHAU, HENRY, U.S. diplomat, financier	Apr. 26, 1856	Nov. 25
MOŚCICKI, IGNACY, Polish statesman and scientist	1867	Oct. 2
MOSS, SANFORD ALEXANDER, U.S. mechanical engineer	Aug. 23, 1872	Nov. 10
NASH, PAUL, British painter	May 11, 1889	July 11
NEILSON, WILLIAM ALLAN, U.S. educator	Mar. 28, 1869	Feb. 13
NEVINSON, CHRISTOPHER RICHARD WYNNE, British artist	Aug. 13, 1889	Oct. 7
NOSKE, GUSTAV, German politician	1868?	Nov. 29
NOWAK, JULIAN, Polish statesman, educator	1865?	Nov. 10
NOYES, THEODORE WILLIAMS, U.S. editor	Jan. 26, 1858	July 4
OLDFIELD, BERNA (BARNEY) ELI, U.S. racing driver	Jan. 29, 1878	Oct. 4
OMAN, SIR CHARLES WILLIAM CHADWICK, British historian	Jan. 12, 1860	June 23
OPPENHEIM, EDWARD PHILLIPS, British novelist	1866	Feb. 3
ORGAZ YOLDI, LUIS M., Spanish army officer	(?)	Jan. 31
ORSENIGO, CESARE, Italian prelate	Dec. 13, 1873	Apr. 1
PARRADO Y GARCIA, AUGUSTIN, cardinal archbishop of Granada	Oct. 5, 1872	Oct. 8
PATTERSON, JOSEPH MEDILL, U.S. publisher and editor	Jan. 6, 1879	May 26
PEIRCE, HAYFORD, U.S. archaeologist	1883?	Mar. 4
PELLEY, JOHN JEREMIAH, U.S. railway executive	May 1, 1878	Nov. 12
PERTH, ARCHBISHOP OF (HENRY FREWEN LE FANU), British cleric	Apr. 1, 1870	Sept. 9
PETTITT, THOMAS, U.S. tennis star	1860?	Oct. 17
PEW, J. EDGAR, U.S. industrialist	Sept. 27, 1870	Nov. 22
PHELAN, JOHN J., U.S. athletic commissioner	June 2, 1872	Jan. 22
PINCHOT, GIFFORD, U.S. politician	Aug. 11, 1865	Oct. 4
PLUMMER, HENRY CROZIER, British astronomer	Oct. 24, 1875	Sept. 30
POINDEXTER, MILES, U.S. politician	Apr. 22, 1868	Sept. 21
POLLOCK, CHANNING, U.S. playwright	Mar. 4, 1880	Aug. 17
PONSONBY OF SHULBREDE, 1ST BARON OF (ARTHUR AUGUSTUS WILLIAM HARRY PONSONBY), British author, politician	Feb. 16, 1871	Mar. 24
PORTER, CLAUDE R., U.S. jurist	July 8, 1872	Aug. 17
POTEMKIN, VLADIMIR PETROVICH, Russian diplomat	1878	Feb. 23
PRESTES DE ALBUQUERQUE, JULIO, Brazilian lawyer, politician	Mar. 15, 1882	Feb. 9
RAGLAND, ("RAGS") JOHN MORGAN LEE, U.S. comedian	1905?	Aug. 20
RAIMU, JULES, French actor	1883?	Sept. 20
RATHBONE, ELEANOR FLORENCE, British politician	1872?	Jan. 2
REQUENA, RAFAEL, Venezuelan archaeologist, anthropologist, physician	Oct. 24, 1879	Apr. 20
RHYS, ERNEST, British author, editor	July 17, 1859	May 25
RIBBENTROP, JOACHIM VON, German statesman	Apr. 30, 1893	Oct. 16
RICHARDSON, HENRY HANDEL (HENRIETTA ROBERTSON), British novelist	(?)	Mar. 20
RICHMOND, SIR HERBERT, British naval historian	Sept. 15, 1871	Dec. 15
RINTELEN, ANTON VON, Austrian jurist and politician	Nov. 15, 1876	Jan. 28
RIOS MORALES, JUAN ANTONIO, president of Chile	Nov. 10, 1888	June 27
ROBINSON, MAURICE HENRY, U.S. economist	1866?	Feb. 28
ROSE, ARNOLD JOSEF, Austrian musician	Oct. 24, 1863	Aug. 25

Name	Birth date	Death date
ROSENAU, MILTON JOSEPH, U.S. sanitarian, educator	Jan. 1, 1869	Apr. 9
ROSENBERG, ALFRED, German politician	1893	Oct. 16
ROSENTHAL, MORIZ, Polish pianist	Dec. 18, 1862	Sept. 3
RUNYON, (ALFRED) DAMON, U.S. author and journalist	Oct. 4, 1884	Dec. 10
RUSSELL, HOWARD HYDE, U.S. prohibitionist	Oct. 21, 1855	June 30
SACASA, JUAN BAUTISTA, Nicaraguan statesman	Dec. 21, 1874	Apr. 17
SANDS, WILLIAM FRANKLIN, U.S. diplomat	July 29, 1874	June 17
SASTRI, V. S. SRINIVASA, Indian statesman	Sept. 22, 1869	Apr. 17
SAUCKEL, FRITZ, German politician	Oct. 27, 1894	Oct. 16
SCHMEDEMAN, ALBERT GEORGE, U.S. politician, diplomat	Nov. 25, 1864	Nov. 26
SCOTT, CHARLES W.A., British aviator	1903?	Apr. 15
SEIBERLING, CHARLES WILLARD, U.S. industrialist	Jan. 26, 1861	Sept. 20
SETON, ERNEST THOMPSON, Canadian author	Aug. 14, 1860	Oct. 23
SEYSS-INQUART, ARTHUR, Austrian politician	July 22, 1892	Oct. 16
SHEAFFER, WALTER A., U.S. manufacturer	July 27, 1867	June 19
SHELDON, CHARLES MONROE, U.S. clergyman, writer	Feb. 26, 1857	Feb. 24
SHELDON, EDWARD BREWSTER, U.S. playwright	Feb. 4, 1886	Apr. 1
SINCLAIR, MAY, British novelist	(?)	Nov. 14
SLEZAK, LEO, Czechoslovak opera singer	Aug. 18, 1873	June 6
SMITH, FREDERICK MADISON, U.S. clergyman	Jan. 21, 1874	Mar. 20
SMITH, LOGAN PEARSALL, British essayist and critic	Oct. 18, 1865	Mar. 2
SOUTHWOOD, VISCOUNT, JULIUS SALTER ELIAS, British newspaper publisher	Jan. 5, 1873	Apr. 10
SPRAGUE, ALBERT ARNOLD, U.S. business executive	May 13, 1876	Apr. 6
SPRAGUE, JESSE RAINSFORD, U.S. author	Mar. 23, 1872	Sept. 4
STEIN, GERTRUDE, U.S. author	Feb. 3, 1874	July 27
STERNER, ALBERT, U.S. artist	Mar. 8, 1863	Dec. 16
STEWART, CHARLES, Canadian politician	1868	Dec. 6
STIEGLITZ, ALFRED, U.S. photographer	Jan. 1, 1864	July 13
STILWELL, JOSEPH W., U.S. army officer	Mar. 19, 1883	Oct. 12
STIRBEY, PRINCE BARBU, Rumanian statesman	1873	Mar. 24
STONE, HARLAN FISKE, U.S. jurist	Oct. 11, 1872	Apr. 22
STRAWN, SILAS HARDY, U.S. lawyer	Dec. 15, 1866	Feb. 4
STREICHER, JULIUS, German politician	Feb. 22, 1885	Oct. 16
STRONG, GEORGE VEAZEY, U.S. army officer	Mar. 4, 1880	Jan. 10
SUMMERVILLE, GEORGE J. ("SLIM"), U.S. motion picture actor	1895?	Jan. 5
SWETTENHAM, SIR FRANK ATHELSTANE, British diplomat	1850	June 11
TAI LI, Chinese secret police head	(?)	Mar. 17?
TALMADGE, EUGENE, U.S. politician	Sept. 23, 1884	Dec. 21
TARKINGTON, NEWTON BOOTH, U.S. author	July 29, 1869	May 19
TAYLOR, LAURETTE, U.S. actress	Apr. 1, 1887	Dec. 7
TENER, JOHN KINLEY, U.S. politician, baseball executive	July 25, 1863	May 19
TERAUCHI, COUNT JUICHI, Japanese army officer	1879	June 12
THORNE, WILL, British M.P.	Oct. 8, 1857	Jan. 2
TILZER, HARRY VON, U.S. song writer, publisher	1873	Jan. 10
TIXIER, ADRIEN, French politician	1893	Feb. 18
TOCH, MAXIMILIAN, U.S. chemist, art expert	July 17, 1864	May 28
TRITTON, SIR WILLIAM ASHBEE, British mechanical engineer	1876	Sept. 24
TUTTLE, HENRY EMERSON, U.S. artist	Dec. 10, 1890	Mar. 8
UBICO, JORGE, Guatemalan politician, army officer	Nov. 10, 1878	June 14

Name	Birth date	Death date
UTLEY, GEORGE BURWELL, U.S. librarian . . .	Dec. 3, 1876	Oct. 4
VALENTINE, LEWIS JOSEPH, U.S. police official . . .	Mar. 19, 1882	Dec. 16
VICKERY, HOWARD LEROY, U.S. naval officer . . .	Apr. 20, 1892	Mar. 21
WAESCHE, RUSSELL RANDOLPH, U.S. coast guard officer . . .	Jan. 6, 1886	Oct. 17
WALKER, JAMES J., U.S. politician . . .	June 19, 1881	Nov. 18
WARBURG, MAX M., U.S. banker, philanthropist . . .	June 5, 1867	Dec. 26
WELLS, GABRIEL, U.S. bibliophile . . .	Jan. 24, 1861	Nov. 6
WELLS, HERBERT GEORGE, British author . . .	Sept. 21, 1866	Aug. 13
WHELOCK, LUCY, U.S. educator . . .	Feb. 1, 1859	Oct. 2
WHITAKER, JOHN THOMPSON, U.S. journalist . . .	Jan. 25, 1906	Sept. 11
WHITE, STEWART EDWARD, U.S. novelist . . .	Mar. 12, 1873	Sept. 18
WILKINSON, THEODORE STARK, U.S. naval officer . . .	Dec. 22, 1888	Feb. 21
WILLIAMS, VALENTINE, British journalist, author . . .	Oct. 20, 1883	Nov. 20
WILLS, WILLIAM HENRY, U.S. politician, industrialist . . .	Oct. 26, 1882	Mar. 6
WILSON, HUGH ROBERT, U.S. diplomat . . .	Jan. 29, 1885	Dec. 28
WILSON, MORRIS W., Canadian banker . . .	Mar. 1, 1883	May 13
YOST, FIELDING HARRIS, U.S. football coach . . .	Apr. 30, 1871	Aug. 20
YOUNG, VINCENT, U.S. composer . . .	Sept. 27, 1898	Apr. 5

Obstetrics*See* GYNAECOLOGY AND OBSTETRICS.**Occupation, Military***See* ALLIED CONTROL COMMISSION FOR AUSTRIA; ALLIED CONTROL COUNCIL FOR GERMANY; ALLIED CONTROL ORGANIZATION FOR JAPAN; ALLIED MILITARY GOVERNMENT.**Occupational Therapy for the Wounded***See* REHABILITATION OF THE DISABLED.**OCD (Office of Civilian Defense)***See* AIR RAID DEFENSE; WAR AND DEFENSE AGENCIES.**Ocean Liners***See* SHIPBUILDING.**Oceanography***See* GEOLOGY; MARINE BIOLOGY.**OCIAA (Office of the Coordinator of Inter-American Affairs)***See* WAR AND DEFENSE AGENCIES.**"Octagon" Conference (Quebec, 1944)***See* INTERNATIONAL CONFERENCES, ALLIED (WORLD WAR II).**ODA (Office of Defense Aid)***See* WAR AND DEFENSE AGENCIES.**ODT (Office of Defense Transportation)***See* WAR AND DEFENSE AGENCIES.**OEM (Office for Emergency Management)***See* WAR AND DEFENSE AGENCIES.**OEK (Office of Economic Warfare)***See* WAR AND DEFENSE AGENCIES.**Office for Emergency Management***See* WAR AND DEFENSE AGENCIES.**Office of Civilian Defense***See* AIR RAID DEFENSE; WAR AND DEFENSE AGENCIES.**Office of Civilian Requirements***See* WAR PRODUCTION.**Office of Contract Settlement***See* WAR AND DEFENSE AGENCIES.**Office of Defense Aid***See* WAR AND DEFENSE AGENCIES.**Office of Defense Transportation***See* WAR AND DEFENSE AGENCIES.**Office of Economic Stabilization***See* WAR AND DEFENSE AGENCIES.**Office of Economic Warfare***See* WAR AND DEFENSE AGENCIES.**Office of Education, U. S.***See* EDUCATION; FEDERAL SECURITY AGENCY.**Office of Foreign Relief and Rehabilitation Operations***See* WAR AND DEFENSE AGENCIES.**Office of International Information and Cultural Affairs***See* EDUCATION.**Office of Petroleum Coordination***See* PETROLEUM.**Office of Price Administration***See* PRICE ADMINISTRATION, OFFICE OF.**Office of Production Management***See* WAR AND DEFENSE AGENCIES.**Office of Scientific Research and Development***See* WAR AND DEFENSE AGENCIES.**Office of Stabilization Administrator***See* WAR AND DEFENSE AGENCIES.**Office of Strategic Services***See* PSYCHOLOGICAL WARFARE; PSYCHOLOGY; WAR AND DEFENSE AGENCIES.**Office of (the Coordinator of) Inter-American Affairs***See* WAR AND DEFENSE AGENCIES.**Office of War Information***See* PSYCHOLOGICAL WARFARE; PSYCHOLOGY; WAR AND DEFENSE AGENCIES.**Office of War Mobilization and Reconversion***See* WAR AND DEFENSE AGENCIES.**OFRRO (Office of Foreign Relief and Rehabilitation Operations)***See* WAR AND DEFENSE AGENCIES.**O. Henry Memorial Awards***See* LITERARY PRIZES.

404 Ohio

A north central state of the United States, Ohio is popularly known as the "Buckeye state." Area, 41,222 sq.mi., including 100 sq.mi. of water. Population (1940) 6,907,612, of whom 2,294,626 were rural and 4,612,986 urban; native white 6,047,265, foreign-born white 519,266, Negro 339,461, other races 1,620. Capital, Columbus (306,087). Other cities of more than 100,000: Cleveland (878,336); Cincinnati (455,610); Toledo (282,349); Akron (244,791); Dayton (210,718); Youngstown (167,720) and Canton (108,401). On July 1, 1944, the bureau of census estimated the population at 6,836,667.

Ohio's flood disasters in 1937 were the greatest in its history. On Jan. 18 all river cities were inundated, from Steubenville to Cincinnati. Gas was shut off in most of the cities, and electric power plants were closed. On Jan. 22, the estimated number of flood refugees in Ohio had risen to 140,000 and the state began to raise a rescue army. One day later the American Red Cross took over the relief work. On Jan. 24, the Ohio river at Cincinnati had risen to 77.4 ft. and fire had broken out there which caused a loss of more than \$1,000,000. The next day it was estimated that 550,000 were then homeless. City Manager C. A. Dykstra was given complete control of flood activities in Cincinnati and Gov. Martin L. Davey signed an emergency act passed by the state assembly allotting \$250,000 to flood relief. On Jan. 28, the river reached a flood stage of 79.99 ft. at Cincinnati, the highest in history. By that time an estimated 750,000 had been rendered homeless, and 14 lives had been lost.

A year of labour trouble in Ohio began in Jan. 1937 with strikes at the Libbey-Owens-Ford Glass company and a gas company at Toledo. After minor labour disputes in April at Akron rubber plants, strikes broke out in the steel mills of Canton and Massillon on May 26 and immediately spread to Cleveland, Youngstown and Warren. On June 9, there were riots at the Republic Steel's Bessemer plant in Youngstown. These were followed, June 18, by riots at the plants in Canton. One man was killed and 14 were injured in Youngstown and on June 21, Gov. Davey ordered several companies of the Ohio national guard to Youngstown and Warren. Disorders continued in Canton, culminating in another riot there, July 1. Troops were sent there and later to Cleveland, where further rioting occurred. The series of disorders ended with the riot at Massillon on July 11, 1937, when one person was killed and six others were shot. A few days later, the steel mills in all cities affected by the strikes were preparing to reopen.

The Republican party won all the state offices in the Nov. 1938 election. It captured 15 of the state's 24 seats in the U.S. house of representatives and won the single contest for a seat in the senate. The party also won sizable majorities in both houses of the state general assembly. John W. Bricker (Rep.) received 1,263,678 votes to defeat Charles Sawyer (Dem.), who polled 1,146,695 votes in the race for governor. Others elected to principal offices were: Paul M. Herbert, lieutenant governor; Earl Griffith, secretary of state; Don H. Ebright, treasurer; Thomas J. Herbert, attorney general; Carl V. Weygandt, chief justice of the Ohio supreme court. Robert A. Taft (Rep.) was elected to the U.S. senate. Anti-prohibitionists won the majority of the local option elections. A dispute between Gov. Davey and the Federal Social Security board resulted in the state's losing October federal payment of

\$1,356,756 for old-age pensions. The board charged that there were politics and inefficiency in the state administration of the pensions, and the governor accused the board of playing politics. When the state administration complied with the rules, federal payments were resumed and the state borrowed from its own general fund to make the October payments to the state's 112,000 old-age pensioners.

In the last quarter of 1939, Toledo and Cleveland, industrial centres, found their relief funds at the vanishing point. They appealed to Gov. John W. Bricker to call a special session of the legislature to raise additional funds. The governor refused, holding that the cities had not done everything in their power to remedy the situation. He charged that political manipulation of the Work Projects administration was partly responsible for Cleveland's difficulty and pointed out that at a special election in Toledo a relief levy was defeated, with only 11,622 votes in favour of it although there were 11,204 cases or nearly 33,000 people on relief rolls. The governor's stand and his charges brought heated retorts from President Roosevelt, Secretary of the Interior Harold Ickes and Col. Francis C. Harrington, Work Projects commissioner. By transferring funds intended for other purposes and with temporary help from federal agencies, the cities were able to take care of the most desperate cases of need.

While President Roosevelt won Ohio's electoral votes in the Nov. 1940 election by polling 1,773,139 ballots, to 1,586,773 for Wendell Willkie, Republicans won a majority of the state offices. Governor Bricker was re-elected, defeating former Governor Martin L. Davey. Mayor Harold H. Burton (Rep.) was elected to the U.S. senate. Others elected to principal offices were: Paul M. Herbert (Rep.), lieutenant governor; John E. Sweeney (Dem.), secretary of state; Thomas J. Herbert (Rep.), attorney general; Don H. Ebright (Rep.), treasurer; and Joseph T. Ferguson (Dem.), auditor. George H. Bender (Rep.) and Stephen M. Young (Dem.) were elected congressmen-at-large. Elected to the state supreme court were: Charles B. Zimmerman, Edward C. Turner and Gilbert Bettman. Republicans retained control of both houses of the legislature but only by narrow margins. Democrats gained four house seats in congress to achieve equal representation with the Republicans, each having twelve.

Three important actions were taken by the legislature in June 1940. It voted to separate the presidential and state ballots, a Republican stratagem designed to protect Republican candidates for state and county offices from being overwhelmed by straight-ticket voters in the event of a national landslide. It increased maximum old-age pensions from \$30 a month to \$40 and appropriated an additional \$1,000,000 to provide for applicants for pensions who were then on the waiting list. A third important action was the appropriation of \$1,400,000 for poor relief. This, combined with improved business conditions and an Ohio supreme court ruling of July 17 which validated the law authorizing taxing units to issue bonds against delinquent taxes for poor relief, ended all fear of a repetition of the 1939 relief crisis. By Nov. 23, 1940, Ohio's poor relief load was down to 76,200, the lowest in three years.

The 1941 session of the legislature also passed considerable important legislation. Notable new laws prohibited the sale and use of fireworks except for public display; established a new state guard to replace the national guard, which had been made part of the U.S. army; set up uniform traffic regulations conforming with those of other states; legalized medical service associations; forbade sit-

down strikes; required applicants for marriage licences to produce certificates showing freedom from syphilis; and exempted newspapermen from revealing the source of their information in any legal procedure. As defense industries increased production there was a great demand for labour and a consequent shifting of population. A serious housing shortage resulted in some regions, where it was necessary to set up trailer camps and begin emergency housing construction. The situation was most critical in Ravenna, Sandusky, Akron, Dayton, Warren and Youngstown.

Gov. Bricker was re-elected in Nov. 1942 by the largest majority and with the highest percentage of the total vote ever won by a candidate for governor in Ohio. He was the first Republican governor to be elected for three consecutive terms. The entire Republican state ticket was elected by substantial majorities. Paul M. Herbert, lieutenant governor; Don Ebright, treasurer; and Thomas J. Herbert, attorney general, were returned to office for their third consecutive terms. Edward J. Hummel was elected secretary of state. The only Democrat holding office was Joseph T. Ferguson, auditor, who was in the middle of a four-year term. The Republicans also won overwhelming control of the state legislature. In the 23 congressional contests, only three Democrats survived the Republican landslide. Charles S. Bell was elected to the state supreme court, and Judges Roy H. Williams and Edward C. Turner were re-elected. All ran on the Republican ticket.

The 95th general assembly convened Jan. 4, 1943, and adjourned on June 24. It was one of the longest biennial sessions in the state's history. Among the most important of about 200 bills enacted were measures which approved the highest appropriation bill in the state's history; returned the state to eastern standard time; authorized liquor rationing; relaxed employment regulations for females and minors; levied an unemployment surtax on pay rolls of manufacturers expanded by war production; provided prison terms for operators of the "numbers" gambling racket; permitted the state highway director to keep secret his engineers' estimates of highway costs; increased state subsidies for schools more than \$5,000,000; required the state to relieve counties of the expense of caring for indigent patients in institutions for the feeble-minded; established a postwar planning commission and set aside about \$23,000,000 for a postwar welfare building program; increased 1943-44 old-age pension funds by \$10,000,000; and extended for two years the liquid fuel, cigarette and utility excise taxes. The assembly announced that the state's net surplus was about \$42,000,000. On Nov. 10, Governor Bricker formally announced that he would be a Republican candidate for president in the Ohio primaries, forgoing a bid for a fourth term as governor.

After Thomas E. Dewey won the presidential nomination, Gov. Bricker accepted the party's vice-presidential nomination and made extensive campaign trips in behalf of the Dewey-Bricker ticket. That ticket carried Ohio in the Nov. 7, 1944 election by 11,530 votes, polling 1,582,293 to 1,570,763 for the Roosevelt-Truman ticket. Mayor Frank J. Lausche of Cleveland (Dem.) was elected governor. Robert A. Taft (Rep.) was re-elected U.S. senator. Others elected were: George D. Nye (Dem.), lieutenant governor; Edward J. Hummel (Rep.), secretary of state; Joseph T. Ferguson (Dem.), auditor; Don H. Ebright (Rep.), treasurer; Hugh S. Jenkins (Rep.), attorney general; George H. Bender (Rep.), representative-at-large; Carl V. Weygandt, chief justice of the supreme court and Edward S. Matthias and William L. Hart, supreme court judges. The new general assembly was heavily Republican.

Two special sessions of the general assembly were held



Gov. John W. Bricker of Ohio during the 1944 Republican national convention, Chicago, Ill., in which he withdrew as presidential candidate in favour of Thomas E. Dewey to become the party's vice-presidential nominee

in 1944. The first, April 26-28, passed a law to enable Ohioans in the armed services to vote on all national and state candidates and local issues. The second, Sept. 5-6, approved an additional appropriation of \$8,860,000 for teachers' salaries and other school expenses, and suspended for the Nov. 7 election the requirement that ballots be marked with a black lead pencil. A total of 164,472 Ohioans in service voted in the election.

Gov. Frank J. Lausche (Dem.) took the oath of office Jan. 8, 1945, and announced that there would be no wholesale firing of Republicans from the state pay roll. Among the appointments he made were: John M. Hodson as director of agriculture; Perry T. Ford as director of highways; Herbert D. Defenbacher as finance director; Frazier Reams as director of welfare and James W. Huffman as director of commerce. When U.S. Senator Harold H. Burton was appointed to the U.S. supreme court, Huffman was appointed by Gov. Lausche to replace him in the senate. Robert L. Moulton was then named director of commerce.

Ohio: Statistical Data

Table I.—Education (Public)

	1936	1938	1940	1942	1943	1945]
High schools		1,258		1,350	1,250	1,122
Elementary school pupils	950,731	907,023	1,156,181	708,343	704,477	699,773
High school pupils	338,606	343,982		469,101	448,988	413,807
Elementary teachers	25,087	24,626	38,714	22,470	21,385	21,176
High school teachers	16,266	17,460		28,160	18,033	17,284

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1938	1940	1941	1943	1944	1945
Cases on general relief	96,900	86,345	47,980	16,142	11,874	11,350
Cost of general relief	\$1,753	\$1,360	\$782			
Recipients of old-age pensions	111,736	122,885	137,871	134,009	124,960	118,319
Dependent children receiving aid	31,168	27,731	31,730	25,171	8,065	7,465
Blind receiving aid	3,935	3,964	3,998	3,560	3,197	3,034
Workers under unemployment compensation	1,307,393	1,471,300	7,929	7,077	6,903	6,678
Prisoners	8,795					

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1941	1943	1944	1945
Highway mileage	18,536	18,603		18,490	18,456	16,158
Expenditures on highways	\$33,388	\$35,631	\$40,284	\$32,000	\$35,000	\$33,099
Railroad mileage	8,518	8,508	8,870	8,870	8,870	8,870

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1940	1942	1944	1945
Number of banks	713	705	699	687	685	681
Total bank deposits	\$2,318,200	\$2,459,600	\$2,652,800	\$3,602,558	\$5,840,382	\$6,825,043
Number of national banks	248	244	242	241	241	241
Deposits of national banks	\$1,013,395	\$1,138,257	\$1,249,313	\$1,525,397	\$2,565,989	\$3,014,308

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1941	1943	1944	1945
Acreage, principal crops	10,522	10,050	9,894	10,505	10,898	10,844
Leading crops (bu.)						
Apples	8,531	8,756	7,064	2,422	5,395	984
Barley	800	1,250	1,140	800	475	630
Buckwheat	407	192	158		294	306
Corn	163,228	171,250	160,974	174,042	142,956	176,913
Grapes (tons)	38	43	30		24	6
Hay	3,255	3,594	3,325	3,478	3,293	3,473
Oats	35,511	33,150	51,374	29,112	37,224	53,210
Potatoes	10,030	12,600	10,614	8,550	5,810	7,130
Rye	580	1,232	1,332	1,140	608	558
Soybeans	3,249	10,164	13,143	27,468	21,796	20,072
Sugar Beets (tons)	144	363	42		17	32
Tobacco (lb.)	28,587	30,295	26,025	20,308	25,347	21,274
Wheat	46,136	37,150	48,978	26,449	46,805	60,993

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940	1943	1944
Value of mineral production	\$131,025	\$104,813	\$119,751	\$61,457 (est.)	\$189,422	\$190,967
Leading products (value)						
Pig iron	167,077	85,187	147,155	193,284	299,483	294,265
Coal	44,313	33,073	32,196	37,115	78,009	89,941
Clay	24,329	18,275	27,452		16,615	13,341
Natural gas	19,967	17,550	18,818	21,132	27,255	25,286
Stone	9,427	8,971	10,142	10,234	15,599	15,293
Lime	8,654	6,659	8,907	10,181	12,002	11,876
Cement	7,771	7,095	8,234	9,202	8,799	5,958
Sand and gravel	6,607	5,635	6,595	7,182	10,003	8,867

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	694,205	598,397
Wages paid	\$957,650	\$812,676
Value of products	5,099,817	\$4,584,666
Leading products (value):		
Steel works and rolling mills	\$733,351	\$609,805
Motor vehicles	206,134	285,681
Tires and tubes	307,255	268,010
Meat packing, wholesale	139,669	132,484
Blast furnace products	154,655	131,824
Bakery products	105,261	84,325
Petroleum refining	97,298	84,137

The general assembly met in continuous session from Jan. 1, 1945, to July 19. Its outstanding accomplishments were: passage over Gov. Lausche's veto of a bill to increase the state contribution to local school districts; re-enactment of the liquid fuel, cigarette and utility excise taxes; advancement of the primary election and filing dates to enable members of the armed forces to participate in elections; granting of salary increases amounting to about \$5,000,000 a year; and establishing of library survey and code revision commissions. A special session was called

Sept. 5 at which unemployment compensation benefits were increased from a maximum of \$16 a week for 18 weeks to \$21 a week for 22 weeks. The state administration was able to make substantial progress in providing housing for the mentally sick and in adding to and developing state parks and forests.

Thomas J. Herbert, Republican, was elected governor in the election of Nov. 1946, polling 1,166,550 votes to 1,125,997 cast for Gov. Frank J. Lausche, Democrat of Cleveland. Former Governor John W. Bricker, Republican of Columbus, defeated Senator James W. Huffman, Democrat of Columbus, in the race for the United States senate seat, 1,275,774 votes to 947,610. Elected at the same time were: Paul M. Herbert (Rep.) as lieutenant governor, Edward J. Hummel (Rep.) as secretary of state, Don. H. Ebright (Rep.) as treasurer of state, Hugh S. Jenkins (Rep.) as attorney general and George H. Bender (Rep.) as congressman-at-large.

Herbert announced the following appointments before taking office: Chester W. Goble, adjutant general; Frank Farnsworth, agriculture director; Dale Dunifon, commerce director; H. D. Defenbacher, finance director; Murray D. Shaffer, highway director;

Charles L. Sherwood, welfare director; William J. Rogers, industrial relations director.

The general assembly met in special session of June 24, 1946; the principal measures adopted before adjournment on July 8 were those restoring civil service rights to war veterans and appropriating \$5,000,000 for the use of local governments.

The legislature also made additional appropriations of \$4,469,869 for operation of the state universities, \$750,000 for poor relief, \$2,577,420 for operation of the welfare department and \$1,150,000 for construction and improvements of state hospitals.

(P. By.; X.)

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Oil

See PETROLEUM.

Okamura, Yasuji

Okamura (1884–), Japanese army officer, was born in May 1884 in Tokyo. After being graduated from the military academy in 1905 he became adviser to Sun Chuang-fang, Chinese military leader of the 1920s. He later became chief of the military research department of the general staff office and vice chief of staff of the Kwantung army. Okamura was behind most of the intrigue which led to the invasion of Manchuria in 1931 and the occupation of that territory, as well as the northern Chinese provinces, in the ensuing years. Named commander in chief of Japanese forces in north China, he replaced Shunroku Hata as commander in chief of all Japanese armies in China on Nov. 22, 1944. On Sept. 9, 1945, Okamura formally surrendered his forces, variously estimated as upward of 1,000,000 men, to Gen. Ho Ying-chin, supreme commander of Chinese ground forces.

O'Kelly, Seán Thomas

O'Kelly (1882–), Irish statesman, was born Aug. 25, 1882, and was educated in the O'Connell schools, Dublin. One of the founders of the Sinn Fein, he was honorary secretary of the organization, 1908-10 and was general secretary of the Gaelic league, 1915-20. He was Republican member of the Dail from the College Green division of Dublin, 1918-24, and was speaker of the first Dail Eireann, 1919-21. O'Kelly was the Irish Republican envoy to the Paris peace conference and pleaded for recognition of Ireland's independence in 1920. He was also envoy to Rome in 1920 and to Washington, 1924-26. In 1927, he was elected to the Dail Eireann for Dublin North and from 1932 to 1939, he was vice-president of the executive council and minister for local government and public health in De Valera's government.

O'Kelly, who was minister of finance and education in De Valera's cabinet, 1939-45, was unanimously selected by the Fianna Fail, the government party, as its candidate in 1945 for the presidency of Eire to succeed Dr. Douglas Hyde. He defeated the opposition candidates and took office June 25, 1945, for a seven-year term.

Okinawa

Okinawa is the largest island and former seat of Japanese administration of the Ryukyu archipelago, a chain of islands located between 24° and 30° N. and 123° and 130° E. The northernmost of the Ryukyus is 80 mi. S. of Kyushu, the southernmost 73 mi. N.E. of Formosa.

The Okinawa Campaign, 1945.—The U.S. drive across the central Pacific to the Japanese home islands had started in the Gilbert Islands and extended by the summer of 1944 through the Marshalls to the Marianas. In the fall of 1944 Adm. Chester W. Nimitz, commander in chief, United States Pacific fleet, was directed by the joint chiefs of staff to occupy Okinawa and other positions in the Nansei Shoto in order to provide bases for supporting the final attack against the Japanese islands. The Nansei Shoto invasion that immediately followed the Iwo Jima campaign in 1945 was the largest amphibious operation of the Pacific war, with more than 1,400 ships involved. Overall command was assigned to the commander of the U.S. 5th fleet, Adm. Raymond A. Spruance. The joint expeditionary force was commanded by Vice-Adm. Richmond Turner, and the expeditionary troops, the U.S. 10th army, by Lieut. Gen. Simon Bolivar Buckner. The 10th army was composed of the 24th army corps and the 3rd marine amphibious corps.

After months of planning, operations began on March 17, 1945, with preliminary naval air and surface strikes against the entire Ryukyu chain, co-ordinated with strategic army air force bombings of the home islands of Japan and other parts of the empire and of Asia, which succeeded in establishing air and naval supremacy in the Nansei

Front line troops in Okinawa stood quietly in the rain to hear the news of victory in Europe, then returned to battle



Shoto. Naval bombardment and fire support groups arrived off Okinawa on March 25, and in conjunction with naval aviation commenced the destruction of the fortifications which constituted the framework of the defenses of Okinawa. A series of operations to confuse and deceive the Japanese and systematically reduce the outlying defenses was conducted prior to the main landings on Okinawa. On Easter Sunday, April 1, 1945, the 10th army landed its two corps, each employing two divisions abreast, on an eight-mi. stretch of beach south of the centre of the west coast of Okinawa. Initial resistance was light, and two airfields were overrun by noon the first day. One army division advanced rapidly across the breadth of the island. The 3rd marine amphibious corps turned north, while the 24th corps compressed Japanese forces in southern Okinawa. By April 21 the 3rd marine amphibious corps had eliminated all resistance in the north and initiated movement southward to join the 24th corps in its task of destroying the Japanese forces which were resisting with fanatical tenacity from elaborate fortifications along a line across the island just north of Shuri. After repeated assaults hindered by heavy rain and mud which complicated supply problems and hampered all movements, the Shuri position was shattered and the remnants of the Japanese 32nd army, originally a force of about 126,000 men, were cornered and destroyed on the southwestern tip of Okinawa. All organized resistance ended on June 21 after 82 days of struggle. Supporting naval units were subjected to repeated bombing and suicide plane (Kamikaze) attacks throughout the course of the land campaign.

The development of Okinawa as a naval and air base proceeded concurrently with the seizure of the island, and by the time of the surrender of the Japanese in Aug. 1945, planes based on Okinawa were bombing the Japanese islands daily, severing their sea and air communications and preparing the way for the final invasion of the homeland. (See also WORLD WAR II.) (R. S. G.)

Oklahoma

A west south-central state, Oklahoma was admitted as the 46th state Nov. 16, 1907. Its popular name "Sooner state" was derived from the term "sooner" applied to those who entered and staked claims sooner than the law allowed when the first public lands were opened by the run for homesteads, April 22, 1889. Area, 69,919 sq. mi., including water surface (265 sq. mi. in artificial lakes). Population (1940) 2,336,434, of which approximately 62% were rural; approximately 87% were white, 7% Negro, 4% Indian, 2% foreign born. On July 1, 1944, the bureau of the census estimated the population of the state at 2,064,679. The two largest cities were Oklahoma City (204,424), the capital, and Tulsa (142,157).

The governor in 1937 was Ernest W. Marland, elected in 1934 to serve for a four-year term. By action of the 16th legislature (1937) the run-off primary was abolished, the candidate with a plurality in the party primary advancing to the general election.

The year 1938 was marked by an unusually stormy July primary campaign climaxed by a visit of Franklin D. Roosevelt. In the Democratic primary for governor, Leon C. Phillips, former speaker of the state house of representatives, barely defeated W. S. Key, former state Works Progress administrator, by a vote of 179,139 to 176,034. William H. (Bill) Murray, former governor, ranked third with a vote of 148,395. In the Democratic primary for U.S. senator, incumbent Elmer Thomas defeated Gomer Smith by

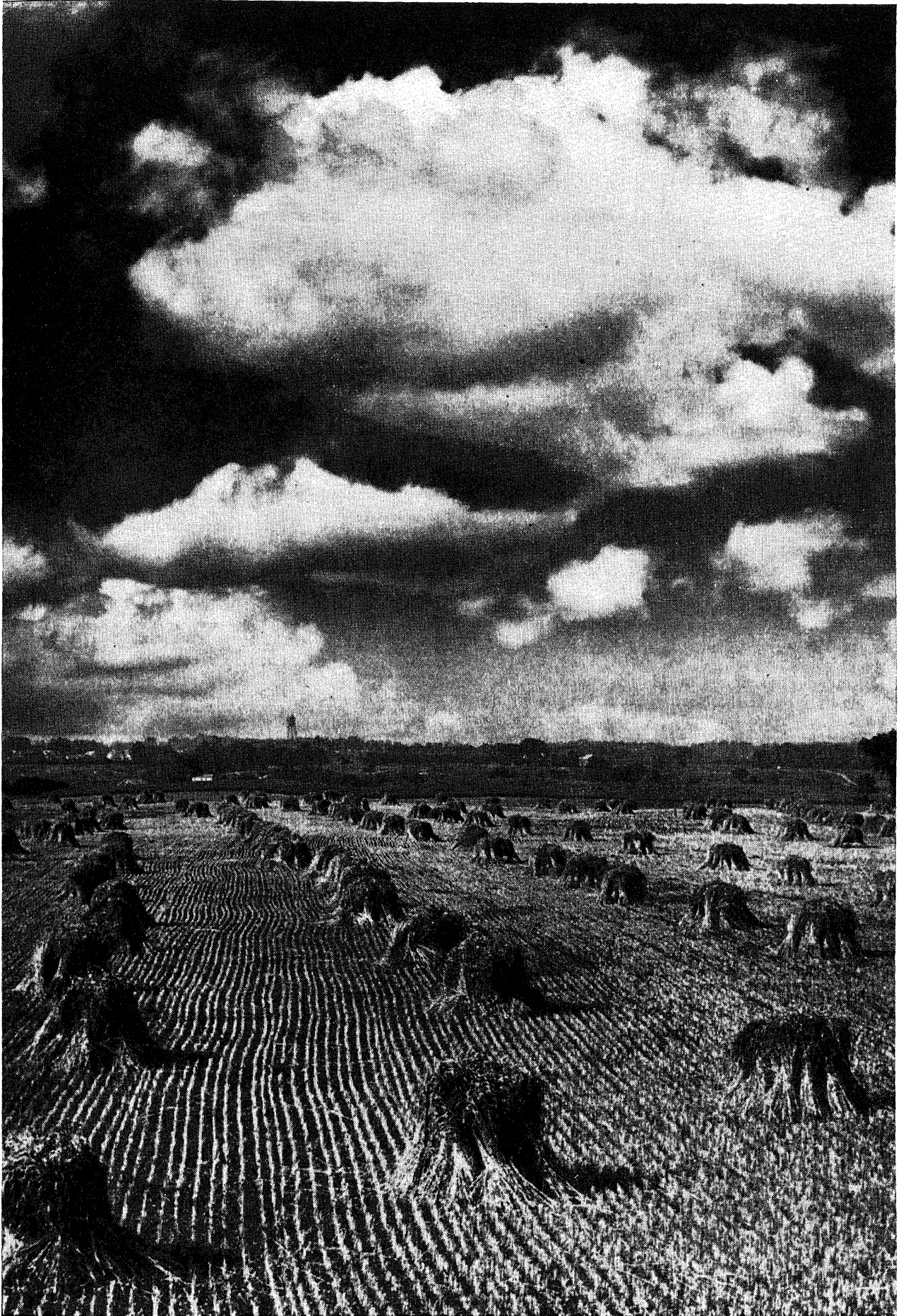
252,550 votes to 190,774. In the Republican primary Ross Rizley and Harry O. Glasser were nominated for governor and U.S. senator, respectively. In the November election, comparatively the quietest after 1918, Phillips defeated Rizley 355,740 votes to 148,861; and Thomas defeated Glasser 307,936 to 159,734. To the other elective offices all Democratic incumbents were returned. With the exception of the 5th district, the incumbent Democratic U.S. representatives were re-elected. Leon C. Phillips was inaugurated Jan. 9, 1939.

The 17th legislature in 1939 remained loyal to the new governor and the session ended with little change in the way of taxation or increased appropriations. The heavy debt of the state had been constantly criticized by the governor and steps were taken in an attempt to bring about a more economical state government. In August the state forced all oil production to cease and for two weeks all wells were shut down. The situation came as a result of similar action taken in Texas and was widely heralded as a price-fixing scheme. However, state officials stoutly maintained that production exceeded the market demand and that the purpose was conservation, since state statutes define any production of oil over market demand as waste. On the educational scene strife developed between the governor and the state department of education over issuance of the \$11,000,000 common school fund. In addition, control of the state teachers colleges was wrested from the state board of education and placed in the hands of a college board of regents. As a result of laws passed by the 17th legislature the so-called teachers colleges were changed to state colleges and in many instances changes were made in the administration of the schools.

Politically, 1940 was comparatively quiet as far as state affairs were concerned. The term of neither senator expired and no important state office was to be filled. In the presidential race Pres. Roosevelt easily won the state's 11 electoral votes with a vote of 474,313 compared with 348,872 for Wendell Willkie. With the exception of the 8th district, all incumbent Democrats were returned to the house of representatives by large majorities. Perhaps the outstanding event of 1940 was the contest between the federal government and Gov. Leon C. Phillips over the flood-control projects in the state. In March the Grand River dam authority ordered the flood gates of a dam in northeastern Oklahoma to be closed, thus flooding acres of farm land and state highways. Gov. Phillips did not feel that the state had been reimbursed properly for the lost highways and attempted to halt the flooding until proper settlement had been made. The governor had called out the national guard and placed the area under martial law before the gates could be closed. However, a federal court order was issued restraining the governor, and the gates were closed before a settlement agreeable to the state was reached.

As 1940 ended the chief interest in Oklahoma was national defense. Plans were being completed for a bombing squadron base for Oklahoma City and an aeroplane assembly plant for Tulsa. In an attempt to thwart any possible fifth column activities several members of the Communist party were indicted by the Oklahoma county grand jury on charges of criminal syndicalism under a law passed during World War I. By the end of 1940 two of the accused had been convicted and sentenced to ten years in prison.

Shocks of wheat gathered on a grain field in Oklahoma. Oklahoma's abundant contributions of wheat and oil were representative of the natural wealth which helped to insure victory for the Allies in World War II



The adoption, at a special election on March 11, 1941, of a constitutional amendment sponsored by Gov. Phillips, provided for the financing of the state government. This amendment required the state to operate with a balanced budget by making unlawful any appropriations or expenditures in excess of current income. Since the state's revenue could not be secured from ad valorem taxes—the income from these going to local units—the state legislature found it necessary to increase the revenue from various tax sources to maintain the functions of government and to pay off the debt resulting from the deficits piled up from 1930 to 1940. As a result of the new levies and the rise in prices and volume of business, revenues during the first quarter of the fiscal year 1941-42 were \$4,000,000 more than those of the preceding year. Two other constitutional amendments were adopted at the March election. The first made possible more liberal old-age pensions. The second established a nine-member board of state regents for higher education, to co-ordinate all state educational institutions. Under Gov. Phillips in 1941 were the following other state officers: James E. Berry, lieutenant governor; C. C. Childers, secretary of state; Frank C. Carter, auditor; Mac Q. Williamson, attorney general; Carl B. Sebring, state treasurer.

Perhaps the most important development of 1942 was the adoption in November of a constitutional amendment making women eligible for election to all state offices. Another constitutional amendment was adopted in July authorizing the legislature to provide for retirement pensions for teachers.

The fiscal year 1941-42 ended with a large surplus and tax collections indicated a surplus for the fiscal year 1942-43.

(R. GTR.; X.)

The administration of Gov. Phillips ended with the beginning of 1943. At the Nov. 1942 election the following officers were elected for four-year terms: Robert S. Kerr, governor; James E. Berry, lieutenant governor; Frank C. Carter, secretary of state; C. C. Childers, auditor; A. S. J. Shaw, treasurer; Mac Q. Williamson, attorney general; A. L. Crable, superintendent of public instruction; John Rogers, state examiner and inspector; W. A. Pat Murphy, commissioner of labour; Mabel Bassett, commissioner of charities and corrections; Jess G. Read, commissioner of insurance; Robert H. Brown, chief mine inspector; Joe C. Scott, president of state board of agriculture.

In the elections, Nov. 1944, the total vote cast for presidential electors was 722,636, the Democrats carrying the state by a plurality over the Republicans of 82,125. Elmer Thomas (Dem.) was re-elected U.S. senator. Representatives in congress, six Democrats, two Republicans. Mac Q. Williamson, attorney general, resigned to enter the armed forces and Randall S. Cobb was appointed to succeed him.

Oklahoma: Statistical Data

Table I.—Education (Public)

	1936	1938	1941	1942	1944	1945
High schools		851	819	845	825	825
Elementary school pupils	530,806	505,383	466,597	399,690	355,537	355,537
High school pupils	127,243	133,279	139,597	128,603	150,707	150,707
Elementary teachers	14,348	14,000	20,980			
High school teachers	5,222	6,098	5,154	19,391	17,236	17,236

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1938	1940	1941	1942	1944	1945
Cases on general relief	26,200	15,135	11,514			
Cost of general relief	\$90	\$65	\$50			
Recipients of old-age pensions	64,767	72,750	76,469	77,749	77,160	81,956
Dependent children receiving aid	34,618	42,623	44,879	19,941	33,209	39,668
Blind receiving aid	2,021	2,228	2,153	2,184	1,944	1,898

Table III.—Communications

(Money figures in thousands of dollars)

	1937	1938	1939	1941	1942	1945
Highway mileage		8,513	8,607			
Expenditure on highways	\$21,022	\$15,202	\$8,915	\$21,571	\$23,000	
Railroad mileage	6,631	6,535	6,313	6,487	6,478	6,315

Table IV.—Banking and Finance

(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1942
State revenue	\$80,900	\$83,095	\$80,532		\$74,353	\$81,370
State expenditure	\$71,381	\$82,658	\$70,229		\$80,429	\$87,170
State net debt	\$11,936	\$10,755			\$37,624	
State gross debt	\$12,899			\$35,879	\$43,223	
Number of banks	401	398	396	391		389
Total bank deposits	\$444,900	\$445,800	\$458,900	\$465,700		\$577,643
Number of national banks	216	214	211	208	207	207
Deposits of national banks	\$387,685	\$397,022	\$407,112	\$408,104	\$442,771	\$503,104

Table V.—Agriculture

(All figures in thousands)

	1937	1939	1941	1943	1944	1945
Acreage, principal crops	13,130	12,760	13,350			
Income from crops and livestock	\$181,500	\$168,335	\$256,576			
Leading crops (bu.):						
Barley	2,048	6,048	7,218	3,328		
Corn	30,960	27,216	31,202	23,350	32,958	26,268
Cotton (bales)	773	526	750	385	640	295
Grain sorghums	13,810	9,600	13,260	5,355	12,915	7,371
Hay (tons)	680	755	1,716	1,657	1,989	1,979
Oats	27,347	21,114	25,900		27,569	19,855
Wheat	65,462	60,438	48,610	31,711	85,914	70,917

Table VI.—Manufacturing

(Money figures in thousands of dollars)

	1937	1939	1943 (est.)	1945
Wage earners	29,551	28,114	99,969	97,916
Wages paid	\$34,390	\$30,465	\$213,000	\$222,793
Value of products	\$366,089	\$312,168		
Leading products (value):				
Petroleum	\$144,475	\$106,667		
Meat packing	\$38,556	\$33,002		
Flour and grain mill products	\$33,120	\$23,023		

Table VII.—Mineral Production

(All figures in thousands of dollars)

	1937	1938	1939	1940	1941	1944
Total value of mineral prod.	\$367,444	\$272,860	\$236,177	\$236,000	\$260,000	\$253,284
Leading products (value, est.):						
Petroleum	283,500	209,500	166,300	162,500	175,000	
Natural gas	32,039	27,391	28,103	31,603	31,000	
Natural gasoline	20,272	14,373	15,502	8,926	13,043	
Zinc	17,640	10,841	14,599	20,530	24,990	
Lead	3,521	1,937	2,606	2,124	2,852	
Coal	3,841	2,947	2,486	4,350	5,000	

In the elections of Nov. 1946, the total vote cast for five candidates for governor was 494,599 votes. The Democratic candidate, Roy J. Turner, had a total vote of 259,491, carrying the state by a majority of 32,065 over the Republican candidate, Olney F. Flynn, who had a total vote of 227,426 votes. Other executive officers elected by the Democrats for the four-year term were: James E. Berry, lieutenant governor; Wilburn Cartwright, secretary of state; A. S. J. Shaw, state auditor; Mac Q. Williamson, attorney general; John D. Connor, state treasurer.

(M. H. W.)

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Old-Age Insurance

See SOCIAL SECURITY.

Old-Age Pension

See LAW; RELIEF; SOCIAL SECURITY. See also under various states.

Oleomargarine

See MARGARINE.

Olives

See FRUIT; VEGETABLE OILS AND ANIMAL FATS.

Oman and Muscat (Masqat)

See ARABIA.

Onions

See VEGETABLES.

Ontario

With 412,582 sq.mi. of territory, Ontario is Canada's second largest province and is 17,000 sq.mi. greater than France and Germany combined. Of its total 12%, or 49,300 sq.mi., is fresh water. Although an inland province it has 680 mi. of ocean shore line along Hudson and James bays in the north, and 2,362 mi. of fresh-water shore line along the Great Lakes in the south.

During the 1937-46 decade the province's population increased notably and there was a slight but significant modification in its composition. Though only fourth in density, Ontario had more people than any other Canadian province. The figures are: (1931) 3,431,683; (1941) 3,787,655; (1946 est. by the dominion bureau of statistics) 4,004,000. Population centres in 1941 were: the capital, Toronto (667,457); Hamilton (166,337); Ottawa (154,951); Windsor (105,311) and some smaller cities. All of these grew at twice as fast a rate as the rural areas, especially during World War II when industrial activities required concentrations of population.

Lieutenant governors in office during the decade were: Col. H. A. Bruce (Oct. 25, 1932-Nov. 23, 1937); Albert Matthews (after Nov. 23, 1937). Premiers were: Mitchell F. Hepburn (July 10, 1934-Oct. 21, 1942); G. D. Conant (Oct. 21, 1942-May 18, 1943); H. C. Nixon (May 18, 1943-Aug. 17, 1943); Col. George A. Drew (after Aug. 17, 1943).

At the beginning of the 1937-46 decade Ontario had 33% of Canada's population, 50% of its mineral wealth and was capable of producing 50% of its manufactures. About 45% of the dominion's national income went to Ontario. These economic facts made the political history of Ontario during the decade especially significant.

After nearly 40 years of Liberal administrations, from its creation as a province in 1867 to 1905, Ontario experienced first an upsurge of conservatism (1905-19) and then a flurry of agrarianism (1919-23). In the latter year the Conservatives were returned to power and held office, under two premiers, until 1934. Then Mitchell Hepburn led the Liberals back to office, beginning a ten-year Liberal regime marked chiefly by sound financing. Other Liberal legislation during the 1934-43 period included expansion of the province's social services, compulsory pasteurization of milk, venereal disease control and compulsory recognition of the bargaining agencies among workers. The police courts of the province were reorganized and stipendiary magistrates introduced. A spirited battle took place with the large power interests and a significant reduction in electrical rates resulted. The provincial hydroelectric system was extended widely to include 821 municipalities and many rural areas got electricity for the first time. Uniform insurance laws were enacted. This reform legislation was important because it affected the lives of all the people.

Actual political events, in terms of elections, threw some light on trends of political thought during the period. In 1934 the Liberals had dominated the scene with 66 seats, with the Conservatives retaining only 17, the Co-operative

Commonwealth Federation (C.C.F.), making its first bid for provincial power, winning only 1 and independents taking the remaining 6. Three years later the Liberals retained power with 63 seats, the Conservatives started their road back with 23 seats, while the C.C.F. was routed. The other four seats went to independents. In 1942 there was a brief political skirmish when the Liberals extended the life of the legislature a year beyond its legal limit of five years, which may have indicated a feeling that public support was waning. At any rate, after two switches in premiers the Liberals finally went to the country in 1943 and were severely beaten. They retained only 15 seats, the Conservatives climbed to 38, the C.C.F. staged a surprising comeback by winning 34 seats and there were 3 independents.

After the election the Conservatives and the Liberals toyed with the idea of joining forces but rejected the notion, while the C.C.F. resolutely refused to have anything to do with either of the older parties. Col. George A. Drew, Conservative leader commanding the largest single block of seats, was, therefore, called on to form a government; he succeeded, by careful manoeuvring, in avoiding introduction of legislation which would draw the combined opposition of the Liberals and the C.C.F., and retained office until 1945. A sudden decision to appeal to the people resulted in a sweeping victory for the Conservative forces. They won 66 seats, the Liberals were reduced to a corporal's guard of 11, the C.C.F. was greatly eclipsed and held only 8 of the seats won in 1943 and there were 5 independents.

Part of the reason for the great swing in the 1945 return was perhaps a desire by the electorate to achieve stable government. There was another factor, however. In the brief period 1943-45 the Conservatives indicated they were prepared to introduce and enforce major reforms, and this attracted public support. Chief among these reforms was the setting up of a department of planning and development with divisions of conservation, town and community planning and trade and industry promotion. Conservation took jurisdiction over all natural resources except coal, oil, gas and minerals; town and community planning gave aid in problems of growth and administration; trade and industry promoted industrial engineering and fostered postwar trade with foreign countries (Ontario house was re-established in London, England, in 1944). In 1945 the government announced a \$192,000,000 road-building program to be completed by 1950. Important legislation of 1946 was the Minimum Wage act for men and the establishment of a Farm Products and Grades act which set up minimum requirements for farm produce.

It is interesting to consider Ontario's abundant natural resources—such as having 54% of Canada's copper, 60% of its gold, 100% of its nickel—against this lively political background. The province advanced economically throughout the period. Already the foremost industrially, its industry received further impetus from the requirements of World War II. On every hand investment in factories and equipment increased; the number of workers, the total amount of money received in wages and the gross value of the goods produced expanded amazingly. In the single year of 1944 Ontario's industry used 12,000,000,000 kw.hr. of electrical energy, with the demand so great on the developed hydroelectric sites that amusement and non-essential uses of power had to be curtailed.

As the largest single mineral producer among the

Ontario: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain..		4.867 Canadian dollars = £1		4.45 Canadian dollars = £1		4.45 Canadian dollars = £1
United States..		1 Canadian dollar = 99.4 cents		1 Canadian dollar = 90.9 cents		1 Canadian dollar = 90.9 cents
Finance						
Provincial revenues . . .	£21,534 (\$105,279)		£30,666 (\$123,644)		£26,069* (\$105,189)	
Provincial ex- penditures . .	£20,597 (\$100,697)		£26,948 (\$108,653)		£25,567* (\$103,164)	
Transportation						
Railroads . . .		10,657 mi.		10,476 mi.		10,479 mi.
Highways . . .		72,574 "		73,089 "†		73,003 " ‡
Communication						
Telephones . .		617,057		704,437		780,087
Telegraph lines						11,231 mi.†
Radio sets . . .		445,867		558,780		627,348†
Minerals						
Gold	2,896,477 oz.		3,194,308 oz.		1,731,836 oz.	
Copper	154,515 tons		166,915 tons		142,654 tons	
Nickel	105,286 "		§		137,299 "	
Natural gas . .	10,952,806,000 cu.ft.		13,053,403,000 cu.ft.¶		7,082,508,000 cu.ft.	
Platinum . . .	161,310 oz.		§		157,523 oz.	
Crops						
Hay and clover	4,796,000 tons		3,760,000 tons		6,166,000 tons‡	
Alfalfa	1,526,000 "		1,577,000 "		2,139,000 "	
Oats	1,314,000 "		1,217,000 "		862,000 "	
Mixed grains . .	913,000 "		701,000 "		937,000 "	
Wheat	643,000 "		531,000 "		624,000 "	
Livestock						
Cattle	2,492,000		2,640,000		1,908,000†	
Swine	1,430,000		1,882,000		1,979,000†	
Sheep	858,000		662,000		724,000†	
Horses	561,000		532,000		492,000†	
Forest products						
Wood pulp . . .	1,057,984 tons		1,507,324 tons		1,316,365 tons	
Paper	1,051,113 "		1,354,634 "		1,152,385 "	
Lumber	439,397,000 bd.ft.		602,248,000 bd.ft.		587,237,000 bd.ft.	
Manufactures						
Total	£380,337† (\$1,880,338)	...	£377,947§ (\$1,676,197)	...	£950,925§ (\$3,836,982)	...
Nonferrous metal smelt- ing and re- fining	£38,885† (\$192,249)	...	£29,169§ (\$129,365)	...	£42,037§ (\$169,620)	...
Automobiles . .	£26,965† (\$133,316)	...	£22,106§ (\$98,039)	...	£79,245§ (\$319,755)	...
Slaughtering and meat packing	£15,355† (\$75,917)	...	£17,208§ (\$76,317)	...	£31,011§ (\$125,131)	...
Electrical appa- ratus and supplies	£15,071† (\$74,510)	...	£14,664§ (\$65,037)	...	£38,219§ (\$154,215)	...
Education						
Enrolment						
Provincial schools	713,031		683,588		684,657	
Private schools	21,382		22,577		26,691	
Dominion Indian schools	4,631		4,477		4,004	
Universities and colleges	39,320		26,853		20,723	

*Provisional figures. †1942. ‡1945. §War restrictions precluded publishing detailed data. ¶1940. †1937. ‡1939.
‡1943.

Canadian provinces, Ontario contributed notably to the nation's war effort. Essential nickel, copper, zinc, magnesium, dolomite, gypsum, silver, platinum, iron ore poured in vast volume from the rich pre-Cambrian belt of the province. There were some spectacular developments. The need for war-vital pig iron led to the diversion of a river, the draining of Steep Rock lake in the northwest and open-pit mining of high-grade hematite iron ore. A railroad had to be built, huge automatic ore-loading docks erected at the head of Lake Superior and other large-scale developments undertaken. Recognizing the increasing importance of mining, the government in 1945 set up an Institute of Mines at Haileybury, Ontario, and thus provided for the first time a technical school for the mining industry.

Expansion of the pulp and paper industry in the northern areas involved large construction projects, such as the building during 1945-46 of new mills and new towns at Red Rock and Blind River.

With the close of World War II Ontario, which had

reaped its industrial harvest of expansion and new wealth during the fighting, was the first province to face difficult industrial problems arising out of the conversion of industry from war to peace. Strikes in key industries, such as shipping and steel, paralyzed other industrial output, and dislocations were widespread. Agriculture, however, because of postwar food requirements both in Canada and abroad, more than held the gains it had made during the war, and continuing wartime shortages of farm help were successfully offset by using the wartime tactics of encouraging urban dwellers to spend their holidays on farms and operating fruit-belt farm camps for boys and girls.

During the 1937-46 decade Ontario maintained its lead as the wealthiest province, its population driving more cars, listening to more radios and using more phones than any other province. The per capita share of the national income moved from \$540 in 1936 to \$824 in 1944, which was direct evidence of the profound impact of World War II on Ontario.

(C. Cy.)

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OPA

See PRICE ADMINISTRATION, OFFICE OF.

Opera

See MUSIC.

Ophthalmology

See EYE, DISEASES OF.

Opium

See DRUG ADMINISTRATION, U.S.; NARCOTICS AND NARCOTIC TRAFFIC.

OPM (Office of Production Management)

See WAR AND DEFENSE AGENCIES.

Oppenheimer, J. Robert

Oppenheimer (1904-), U.S. scientist, was born April 22, 1904, in New York city. He was graduated from Harvard university, Cambridge, Mass., in 1925, and later studied at Cambridge university, and at Goettingen university, Germany. He became professor of physics at the Uni-

versity of California in Berkeley, and at the California Institute of Technology in Pasadena in 1929. During World War II the U.S. government placed Dr. Oppenheimer in charge of a special laboratory for the development and construction of the atomic bomb at Los Alamos, 20 mi. from Santa Fe, N.M. Henry L. Stimson, then secretary of war, declared in his statement of Aug. 6, 1945, that the development of the bomb itself was "largely due to his (Dr. Oppenheimer's) genius." In addition to his duties as chief of the atomic bomb laboratory, he was a member of a four-man advisory group of leading U.S. scientists that worked with a government interim committee on the establishment of postwar organizations to direct and control the use of atomic energy; this committee drafted the May-Johnson bill providing for the strict domestic control of atomic energy. In April 1946 Dr. Oppenheimer returned to his post at the University of California.

Orange Free State

See SOUTH AFRICA, THE UNION OF.

Oranges

See FRUIT.

Oregon

A Pacific northwest state of the United States, Oregon was admitted to the union Feb. 14, 1859, the 33rd state. Area, 96,981 sq.mi., including 631 sq.mi. of water. Population (1940) 1,089,684. On July 1, 1944, the bureau of the census estimated the population of the state at 1,214,226. Capital, Salem (1940 census), (30,908); chief city, Portland (305,394).

The normally Republican state legislature was in Democratic hands at the beginning of the decade 1937-46. The legislature concerned itself primarily with stricter hunting and fishing laws; with forwarding the state building program; with attempting to meet the requirements of the Roosevelt social security program. The state was in a favourable position, except that the jurisdictional difficulties of the American Federation of Labor and the Congress of Industrial Organizations had closed many logging camps and lumber mills and some industries. The state's chief officers in 1937 were: governor, Charles H. Martin; secretary of state, Earl Snell; treasurer, Rufus C. Holman; attorney general, I. H. Van Winkle; superintendent of public instruction, Rex Putnam; and chief justice, Henry J. Bean.

The year 1938 opened with the labour situation greatly improved. Vigorous action by Gov. Martin and by Mayor Joseph K. Carson of Portland and by the law enforcement groups at their command had resulted in the arrest and trial of many "goon" squad leaders. The trial and sentencing of the leaders in the violence, however, while it restored order, had a strong reaction politically. The legislature did not meet during 1938; so this reaction centred around the primaries in May and the general election in November. Gov. Martin, who had incurred the ill will of much of organized labour, was defeated in the primaries by Henry L. Hess, whom labour viewed more kindly. Willis E. Mahoney, who also had the favour of labour, won the Democratic nomination for the U.S. senate. This difficulty, combined with the general Republican resurgence, gave the Republicans practically a clean sweep of the state in the November elections. Charles A. Sprague, Salem newspaper publisher, defeated Hess for the governorship by 55,318 votes. At this election the state passed, by initiative, a measure regulating picketing by unions and laying other restrictions upon them. Organized labour

throughout the country was united in its determination to fight the measure through the courts.

Labour peace was established in Oregon in 1939. The so-called anti-picketing law went into effect. The law prohibited picketing where less than 50% of the employees were involved. As the year ended the A.F.L. was trying out an experiment—using a large "unfair" headline on its own publication and having the paper offered for sale in front of any establishment where there was difficulty. This was held to be the sale of a newspaper rather than picketing, despite the obvious intent of the displayed headline.

The legislature moved into the capitol in Jan. 1939 after a regular and a special session in the Salem armory because of fire in 1935. The lawmakers did little, making minor changes in the income tax. Again they rejected all attempts at a sales tax, voted down repeatedly by the people of the state.

In the presidential election of 1940, Franklin D. Roosevelt received 258,415 votes as against Wendell L. Willkie's 219,555. A Republican state treasurer, Leslie M. Scott, was elected, as was a Republican attorney general, I. H. Van Winkle. Three new representatives were elected to congress: two Republicans, James W. Mott and Homer D. Angell, and one Democrat, Walter M. Pierce. The year 1940 saw Oregon making progress industrially; new manufacturing plants had been attracted by cheap power provided by the federal Bonneville power administration and private electric plants and to increased production demanded by the rearmament program. At the year's end the state's chief industry, lumbering, was employing the greatest number of workers in its history. Established plants were operating night and day and many new, small sawmills were getting into operation. The plywood branch of the industry expanded greatly during the year.

The state's financial situation being favourable, the legislature left taxation approximately as at the beginning of 1941. This restraint proved wise as the year advanced, for the income tax and unexpected inheritance taxes piled up a surplus. Under existing constitutional limitations the money could not be spent. As far as the defense program was concerned Oregon's chief contributions in 1941 were shipbuilding and expansion of lumber production to meet the nation's construction needs. At the end of 1941 there were many thousands of persons at work in the Portland shipyards.

(P. H. P.; K.)

In the Nov. 1942 election Oregon took a leading position in the return to the Republican party. Republican congressional, state and legislative tickets were almost all successful, in some cases by record-breaking pluralities. Earl Snell, Republican, was elected governor. Oregon's contribution to the war effort continued to be largely in shipbuilding and lumber production. The Portland area, including Vancouver, Wash., became the centre of a highly organized ship-construction program, producing a variety of vessels in many different yards. The U.S. Maritime commission announced that the Oregon Shipbuilding corporation, operated by Henry J. Kaiser, held the record for 1942 by turning over to the commission 113 completed Liberty ships. Two large army camps were put into service in 1942 and another the following year.

Oregon was the second state of the continental United States to be attacked in World War II and the first to be bombed from the air. On June 21, 1942, several explosive shells were fired from the sea, presumably from a Japanese submarine. They landed south of the mouth of the Colum-

bia river in the northwest part of the state. On Sept. 9 a very small plane was seen flying eastward in the vicinity of Brookings and shortly thereafter explosions were heard and some bomb fragments and incendiary material were found. The plane was apparently based on a Japanese submarine.

The legislature met in Jan. 1943. Total appropriations for the biennium of 1943-45 amounted to \$23,723,365, an increase of about \$2,800,000 over the previous biennium. An act was passed providing for a reduction in the state personal income tax rates. Late in 1943 the tax commission announced that the rate applicable for the 1943 tax would be reduced by 75%. The legislature also referred a sales tax proposal to a popular vote to be held at the general election in Nov. 1944. The year 1943 was Oregon's centennial year for the first large immigration over the Oregon trail in 1843. Public and civic organizations of Portland subscribed a fund of \$100,000 and employed Robert Moses of New York city to investigate Portland's postwar problems. Moses and his staff presented a detailed plan calling for the expenditure of \$75,000,000 for postwar projects, most of them designed to improve local traffic conditions.

Oregon: Statistical Data
Table I.—Education (Public)

	1936	1938	1940	1941	1942	1944
Elementary school pupils	131,433	133,374	142,871	138,121	154,137	171,333
High school pupils	56,928	60,487	63,057	68,594	60,503	54,687
Elementary teachers	4,793	4,851	8,104	7,822	7,997	8,024
High school teachers	2,224	2,374				

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
Cases on general relief	12,880	14,123	8,775	9,291	6,581
Cost of general relief	\$221	\$222	\$137	\$140	\$108
Recipients of old-age pensions		18,846		19,173	21,059
Cost of old-age pensions		\$401		\$410	\$451
Dependent children receiving aid		3,444		4,674	4,887
Blind receiving aid		434		452	465
Workers under unemployment compensation		142,060	155,926	191,200	

Table III.—Communications
(Money figures in thousands of dollars)

	1938	1939	1942	1943	1944	1945
Highway mileage	6,981	7,048	4,368	4,806	4,805	4,806
Expenditures on highways	\$16,820	\$16,182	\$15,587	\$13,504	\$11,450	\$9,928
Railroad mileage	3,428	3,428	3,665	3,629		

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941
State revenue	\$41,479	\$46,674	\$43,555		
State expenditures	\$35,352	\$32,446	\$30,549		
State gross debt	\$48,789			\$37,592	\$34,986
Number of banks	80	77	75	74	
Total bank deposits	\$285,400	\$281,400	\$300,400	\$333,400	
Number of national banks	28	28	27	26	
Deposits of national banks	\$247,366	\$254,637	\$278,187	\$324,743	

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1941	1943	1944
Income from crops and livestock	\$118,100	\$104,579	\$111,664			
Leading crops (bu.)						
Apples	3,320	2,900	3,160	2,673		
Barley	4,160	5,369	5,000	6,048	10,476	7,142
Corn	2,178	2,046	1,860	1,920	1,825	1,484
Hay	1,428	1,476	1,532			
Hops	24,530	17,852	19,992			
Oats	10,360	11,725	7,950	10,426	11,818	10,828
Pears	3,550	4,229	4,445			
Potatoes	7,840	7,200	8,510			
Wheat	20,424	16,108	17,184	3,105	19,734	23,105

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939
Wage earners	65,982	63,622
Wages paid	\$79,492	\$77,586
Value of products	\$194,085	\$365,374
Leading manufactured products (value):		
Saw mills	\$127,761	\$108,663
Logging camps		23,363
Meat packing	17,255	15,178
Flour and grain mill products	19,138	17,344
Preserved fruit and vegetables	24,213	23,045
Paper mills	16,644	15,699

Table VII.—Mineral Products
(All figures in thousands of dollars)

	1937	1938	1939	1940
Value of mineral production	\$6,610	\$7,536	\$8,636	
Leading products				
Gold	1,843	2,861	3,268	\$3,980
Sand and gravel	1,075	927	1,233	860
Stone	1,443	2,025	1,682	2,235

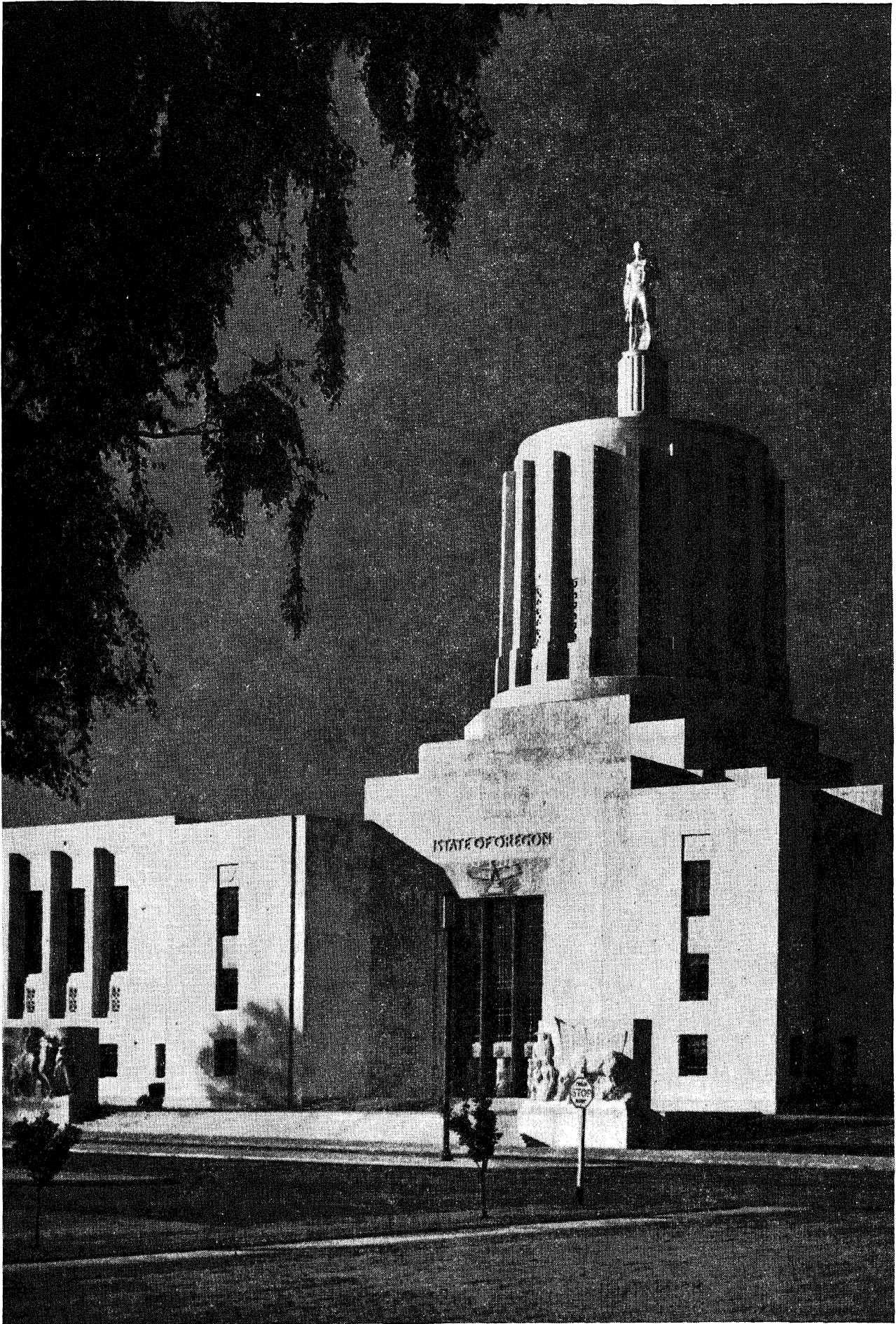
On Nov. 7, 1944, Oregon, traditionally Republican, gave the Democratic electors a total of 248,635 votes and cast 225,365 for the Republican ticket. The Roosevelt-Truman plurality was 23,270. At the same time voters returned a complete Republican congressional delegation, including Wayne L. Morse and Guy Cordon as senators for the six- and four-year terms, respectively. The four representatives re-elected were James W. Mott, Lowell Stockman, Homer D. Angell and Harris Ellsworth. Republicans were generally elected to other positions, including a majority of the posts for the state legislature. At the November election a bill for a sales tax, submitted to popular vote, was defeated. A modified form of the Townsend plan was also defeated. A legislative act to return the sale of fortified wines to the state liquor stores was approved by the people. The budget for the biennium beginning July 1, 1945, was prepared for the 1945 legislature, calling for an expenditure of \$26,777,500 for the administration and operation of state activities supported by the general fund. It was planned to finance the budget without a state property tax, sufficient funds being available for budget requirements. The tax commissioner announced that the rate applicable to the 1944 personal income tax would be 70% of par, or a discount of 30%.

The 1945 session of the legislature appropriated \$40,616,150 as compared with \$24,164,706 in 1943. The increase was mainly for new buildings, improvements at state institutions and for the state system of higher education. At a special election on June 22 voters ratified the acts concerned with these buildings and improvements, but a bill to levy taxes on cigarettes failed of popular support. The state highway commission tentatively adopted a three-year highway construction program calling for an expenditure of \$35,000,000. In addition a federal program was adopted, calling for about \$5,000,000 for forest highways and similar roads on federal lands in the state.

Toward the end of 1945 a large part of the lumber industry in Oregon was stopped by strikes. In July and August there were unusually severe forest fires in the Tillamook burn area, the scene of a devastating fire in 1933. The 6 major shipyards in the Portland area produced 232 seagoing ships in 1945. After the end of hostilities ship production was greatly reduced, and in December it was estimated that there were fewer than 25,000 people working in Oregon yards. During the 4-year war construction period 1,174 ocean vessels were built in Portland and vicinity with total payroll outlays of \$1,088,000,000. In 1945 it was announced that Portland had been the principal shipping port for lend-lease goods to the U.S.S.R. and that cargo valued at about \$750,000,000 had moved out in this activity.

On May 5, 1945, a party of picnickers discovered a contrivance which turned out to be a Japanese bomb carried into the country by a balloon. It exploded, killing one woman and five children, the only known casualties by axis attack in the continental United States during World

The Oregon state capitol building at Salem was designed in modernized Greek architecture and completed in 1939. The statue of a pioneer, rising 40 ft. above the tower, was executed in bronze by Ulric H. Ellerhausen



War II. On Nov. 12 James W. Mott (Rep.), congressional representative from 1933, died after a short illness. At a special election held on Jan. 11, 1946, Walter A. Norblad (Rep.) was elected to succeed him.

At the election on Nov. 5, 1946, Oregon elected Republican candidates by almost a clean sweep. Governor Earl Snell and Secretary of State Robert S. Farrell, Jr., were re-elected by large majorities. Four Republican representatives in congress were also re-elected; the new state senate and house of representatives were predominantly Republican. By popular vote, an amendment to the state constitution was adopted revoking a provision of 1859 which prohibited Chinese from holding Oregon real estate. (L. A. Mc. A.; X.)

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Ortiz, Roberto M.

Ortiz (1886–1942), Argentine president, was born Sept. 24, 1886, in Buenos Aires. While a student at the University of Buenos Aires he joined the Radical party, then under the leadership of Hipolito Irigoyen. He was a member of the city council of Buenos Aires, 1918–20, sat in the chamber of deputies, 1920–24, and was minister of public works, 1925–28. Following the split of the Radical party, he joined the Anti-Personalist faction led by former Pres. Marcelo Alvear, under whom he held a cabinet post.

Ortiz was finance minister in the Justo cabinet from 1935 to 1937, when he was elected president of Argentina. He launched his country upon a policy of democracy and a continuation of its friendship with the United States. Owing to ill health and approaching blindness, Ortiz temporarily gave up his duties of office in July 1940 and resigned from the presidency in June 1942. He died the following month (July 15, 1942) in Buenos Aires.

Oslo

The capital of Norway, known for 300 years under the name of Christiania, Oslo resumed its ancient name in 1924. Situated at the head of Oslo fjord, it has long been one of Scandinavia's leading seaports. At the 1937 census its population numbered 272,496; in 1943, this figure had fallen to 265,600 (est.). The population of the adjoining suburb of Aker numbered 130,000 (est.) in 1946. Although the foundation of the town goes back to the 11th century, it was, in 1946, essentially a modern town, its new town hall and its university being remarkable for their murals and decorations.

The Germans occupied Oslo on April 9, 1940. Airborne troops were the first to enter the city following the bombing of Kjeller airfield and Akershus fortress. Further troops arrived by sea after the outer defenses in Oslo fjord had been forced by the German navy. In the fighting the German cruiser "Blücher" was sunk. German and quisling headquarters were set up in Oslo, the royal palace and the parliament building being used as offices. In Sept. 1940, the first executions of Norwegian patriots occurred in Oslo, and these increased in number as the occupation proceeded. Sabotage increased correspondingly. In

one night of Dec. 1944, 53,000 tons of ships were damaged or sunk, and in March 1945 the headquarters of the railway administration were blown up. The Germans took mass action against patriots, including the arrest and deportation of all the students of Oslo university. After the Germans had announced their capitulation on May 8, 1945, Norwegian home forces took control. Constant celebrations marked the next few months, with the return home of king and government. In most respects, conditions in Oslo rapidly returned to normal. Housing, however, remained an acute problem, Oslo being, at the end of World War II, short of 15,000 homes. To overcome this shortage, the municipality launched extensive building schemes. (H. K. L.)

Osmeña, Sergio

Osmeña (1878–), Philippine statesman, studied at the University of Santo Tomas, P.I., and was admitted to the bar in 1903. After serving in various positions of importance in the island government and on Philippine independence missions to the United States he became vice-president of the Philippines commonwealth in 1935 and was re-elected to this post in 1942. Osmeña fled in Feb. 1942 when Japanese forces were overrunning the country, and followed Pres. Manuel Quezon to Washington, where the latter set up a government-in-exile. After the death of Quezon, Osmeña was sworn in as president of the commonwealth on Aug. 1, 1944. Immediately after U.S. troops invaded Leyte Island on Oct. 20, 1944, Osmeña stepped ashore and subsequently established his provisional headquarters at Tacloban. Continuing as president after the liberation, he was nominated for this office by the Nationalist party but was defeated by Manuel A. Roxas in the elections held on Apr. 23, 1946.

OSRD (Office of Scientific Research and Development)

See WAR AND DEFENSE AGENCIES.

OSS (Office of Strategic Services)

See PSYCHOLOGICAL WARFARE; PSYCHOLOGY; WAR AND DEFENSE AGENCIES.

Osteopathy

Research in the osteopathic concept of disease advanced steadily in osteopathic colleges and other centres during the decade 1937–46, but progress was slow because of World War II and the resultant lack of personnel and finances. Notable among research projects were those by Dr. J. S. Denslow and associates of the Still Memorial Research Trust, Kirksville, Mo., in the fields of electromyography (electrical currents in muscle), reflexes in the spinal cord of man and in the dynamics of the human skeletal system.

In 1938 Frederick A. Long and Paul T. Lloyd published their monograph, "The Use of the Roentgen Ray in the Study of Vertebral Mechanics with Special Reference to Its Adaptation in Osteopathic Procedure," based on research work done at the Philadelphia College of Osteopathy.

Low-back pain and its causes were studied continually at the clinic of the Chicago College of Osteopathy, where a special technique for taking X-ray pictures of patients in the standing position was developed. A difference in leg lengths was noted in 91% of the first 150 cases studied.

Another important research project started previous to

the war in the Institute of Animal Genetics of Edinburgh university, Scotland, concerned the effects of mechanically induced lesions of the lumbar spinal joints on the ovaries of rats. A report, published in *The Journal of Osteopathy* (Kirksville, Mo.), Feb. 1937, indicated that such structural disturbances affect normal gestation time and fertility of rats.

Early in the decade, the six approved colleges of osteopathy, located in Chicago, Des Moines, Kansas City and Kirksville, Mo., Los Angeles and Philadelphia, began requiring for entrance a minimum of two standard years of successful preosteopathic study, including specified basic science subjects, in an accredited university or liberal arts college. The standard minimum curriculum in osteopathic colleges for the professional course continued to require at least 4,000 hours through the standard four college years.

The decade was marked by increased recognition on the part of both the U.S. congress and many state legislatures of the educational qualifications of osteopathic physicians and surgeons for the complete practice of the healing art. The U.S. congress on May 31, 1938, amended the U.S. Workmen's Compensation act to authorize specifically payment by the government to osteopathic physicians and surgeons and in osteopathic hospitals, for the care of government employees sick or injured in line of duty.

Despite specific deferment directives from Selective Service, approximately 575 osteopathic students and physicians enlisted or were inducted in the armed forces. Many of these served in hospital corps or in administrative capacities in the medical corps.

An army appropriation bill, approved June 30, 1941, included a provision for the employment by the medical corps of osteopathic physicians as interns in army hospitals. The same provision was included annually as long as hostilities continued, but the surgeon general of the army failed to appoint any doctors of osteopathy as interns.

Throughout the war, navy appropriation bills included funds for the payment of osteopathic physicians as commissioned officers in the navy medical corps, beginning with the one approved Oct. 26, 1942, but the surgeon general of the navy failed to commission any doctor of osteopathy. By virtue of a law, enacted Aug. 2, 1946, the president of the United States was authorized to appoint graduates of approved osteopathic colleges as commissioned medical officers in the navy.

When congress appropriated funds for the obstetrical care of servicemen's wives, a specific provision included osteopathic physicians among doctors to be paid by the government. Thousands of servicemen's wives were delivered by osteopathic doctors participating in this plan. A law relating to the U.S. public health service, approved July 1, 1944, made osteopathic physicians eligible for appointment as reserve officers, and some were so appointed. The Veterans' administration authorized osteopathic hospitals to treat veterans with service-connected disabilities in emergencies.

Under the provisions of a law approved Aug. 8, 1946, federal departments and agencies were authorized to establish health service programs, with osteopathic physicians expressly eligible to render the professional services involved. In addition, the United States Civil Service commission adopted a ruling to accept medical certificates executed by licensed doctors of osteopathy under the same conditions as those accepted from other private physicians.

While great strides were being made in the recognition accorded the osteopathic school of practice by the U.S.

government, several state legislatures also were amending or completely rewriting their medical practice acts to increase the scope of practice of osteopathic physicians and surgeons commensurate with their education. The following states were added to the list of those giving full practice rights, including the use of major surgery and narcotics and other drugs, to qualified doctors of osteopathy: Indiana, Nebraska, New Jersey, New York and Ohio. Doctors of osteopathy were now qualified to practise major or other forms of surgery under the laws of 42 states and territories. In a similar number of states they could use drugs.

The 1946 Directory of the American Osteopathic association listed 11,175 osteopathic physicians, surgeons and specialists in the United States, Canada, the British Isles, the European continent, South America, India, China and other parts of the world. This represented a gain of 2,184 during the decade. Membership in the American Osteopathic association was 7,852 or 70%.

During the decade, the number of students in the six approved colleges of osteopathy varied from 1,977 before the war to 556 during the war. To give the best possible training under curricular requirements, the total number of students was limited to 1,500.

Expansion programs to increase the faculties and facilities of osteopathic colleges and their associated hospitals began in 1942. The osteopathic profession contributed more than \$1,000,000 to the support of its colleges. In 1946 there was an acceleration of the campaign for funds with a five-year goal of \$7,500,000.

In 10 years the number of osteopathic hospitals and clinics had increased from 260 to more than 300. In 1936, only 18 were approved for the teaching of interns by the American Osteopathic association and the American College of Osteopathic Surgeons, jointly. At the end of 1946, there were 58 hospitals approved for intern-training following rigid annual inspection, and 129 hospitals on the registered list. The intern-training and registered hospitals had a total of 5,489 beds and 1,383 bassinets.

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(R. E. D.; R. G. Hu.)

Ostland

See ESTONIA; LATVIA; LITHUANIA; POLAND.

Osubka-Morawski, Edward Boleslaw

Osubka-Morawski (1904?-), Polish government official, was a member of the Polish Socialist party before the outbreak of World War II. He had been associated with the Warsaw housing co-operative and was active, although not widely known, in the co-operative movement. In 1943 Osubka-Morawski left the Socialist party to join a more leftist faction, the Polish Socialist Workers party; he published an underground paper during the German occu-

pation. Later he left for Moscow and on July 23, 1944, he became head of the Polish Committee of National Liberation, to administer the areas of land freed by the Red army. He was selected as premier of the Polish provisional government in Dec. 1944 and was retained in that post in the permanent government formally installed in Warsaw on June 28, 1945. Known as an advocate of government ownership of all industry of national importance, he was also committed to the abolition of all large estates in Poland, except for land owned by the church. Osobka-Morawski, approved by and sympathetic toward the soviet union, frequently came into conflict with his democratic vice-premier, Stanislaw Mikolajczyk, during 1945 and 1946.

Ottawa

First settled in 1800, called Bytown in 1827, incorporated as a city and renamed Ottawa in 1854 and designated capital of Canada in 1857, Ottawa, Ont., in 1946 covered 8.3 sq.mi. of land surrounding the confluence of the Ottawa and Rideau rivers. It is 120 mi. west of Montreal, Que., and 290 mi. northeast of Toronto, Ont.

During the 1937-46 decade the population of the city itself and of the area known as Greater Ottawa (comprising the surrounding townships and the city of Hull in Quebec across the Ottawa river) increased at more than twice the average Canadian rate. The figures were as follows: (1931) 126,872, (1941) 154,951, (1945) 195,223; Greater Ottawa (1931) 175,988, (1941) 215,022, (1945) 224,826. In 1941 the population was 60% British and 31% French and was almost evenly divided Protestant and Roman Catholic.

The outstanding effect of World War II on Ottawa was the enormous expansion of the civil service population to handle the special war-needed government departments—munitions and supply, national war services, army, air services, naval services and, toward the end of the war, reconstruction, veterans' affairs, health and welfare.

Although there was some permanent building prior to the outbreak of war—the new Supreme Court, for example—most of the wartime building consisted of utilitarian wooden structures, called "temporaries," to house the government's new departments.

There was some increase of wartime industrial activity within the city. The 203 factories listed in 1937 increased to 212 by 1945, the 6,000 employees almost doubled and the value of production went from \$21,000,000 to more than \$53,000,000. Trans-Canada Air Lines made Ottawa a port of call in 1937, and in 1946 Colonial Air Lines established direct service to Washington, D.C.

King George VI and Queen Elizabeth attended parliament May 19, 1939, when for the first time in Canadian history royal assent in person was given to bills. The king unveiled World War I memorial on Connaught circle. Other visitors to the city during the decade were: 1941, Winston Churchill; 1943, Madame Chiang Kai-shek, Franklin D. Roosevelt; 1944, John Curtin, Charles de Gaulle; 1945, Jan Christiaan Smuts; 1946, Dwight D. Eisenhower, Bernard Montgomery.

During the decade many new foreign legations and embassies were established, including those of the Netherlands, Brazil, Argentina, China, Poland, Yugoslavia, Czechoslovakia, Chile, U.S.S.R., Turkey and Mexico. High commission offices were opened by Eire, Australia and New Zealand. Ottawa grew as a diplomatic centre.

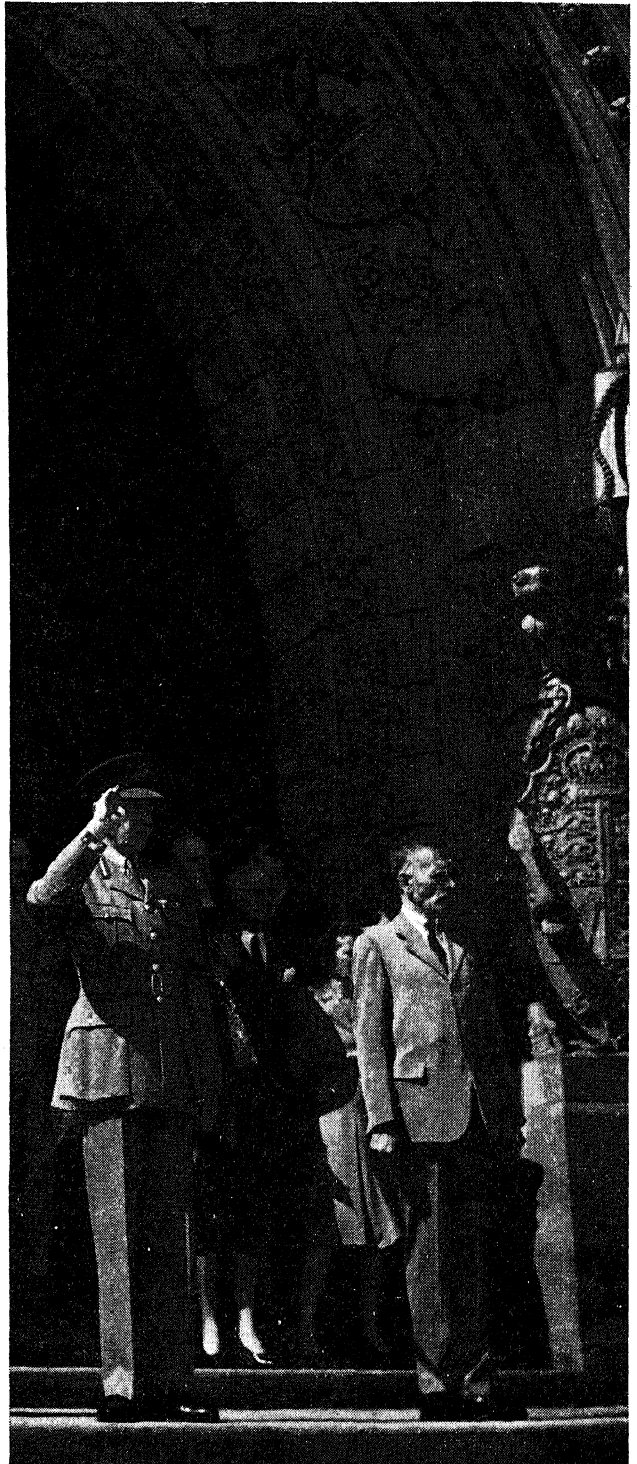
In 1946 the federal government projected the develop-

ment of Ottawa and a large block of surrounding land into a district designated as a national memorial to Canada's World War II dead. The government consulted Jacques Greber, noted French city planner, included Hull and Quebec's beautiful 16,000-ac. Gatineau park in the plan, gave expropriation notice to industries adjacent to Chaudière falls and voted \$3,000,000 for the first part of the memorial proposals.

(C. Cy.)

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The Earl of Athlone (left), governor-general of Canada, returning the salute of parading servicemen and women during victory celebrations at Ottawa on V-J day. Standing beside him under the arched entrance to the Peace tower was Gen. A. G. L. McNaughton, minister of national defense



Outdoor Advertising

See ADVERTISING.

Outer Mongolia

See MONGOLIA.

OWI (Office of War Information)

See PSYCHOLOGICAL WARFARE; PSYCHOLOGY; WAR AND DEFENSE AGENCIES.

OWM (Office of War Mobilization)

See WAR AND DEFENSE AGENCIES.

OWMR (Office of War Mobilization and Reconversion)

See WAR AND DEFENSE AGENCIES.

Oxford Group

The Oxford group, already recognized in 1937 for its attempt to inspire "a Christian revolution for remaking the world," and active in 60 countries, articulated its world philosophy in 1938 when its initiator, Dr. Frank N. D. Buchman, launched the program of Moral Rearmament (M.R.A.) in East Ham, London.

From 1938 to 1946 M.R.A. sought to become the ideological spear point of Christian democracy, proposing a program of sound homes, teamwork in industry and national unity.

Condemned by the gestapo, who described M.R.A. as the "pace-maker of Anglo-American diplomacy" and as supplying "the Christian religious garment for world democratic aims," group leaders in occupied countries served in resistance movements. Fredrik Ramm, Norwegian editor, died after two years in a concentration camp. Men trained in M.R.A. served on every battle front.

On the industrial front the M.R.A. program was welcomed by Pres. Truman. He described *The Forgotten Factor*, one of the dramatizations of M.R.A. used in the U.S., Canada, Great Britain and the British empire, as "the most important play produced by the war." John R. Steelman, special assistant to the president, called M.R.A. "the most effective single force for industrial conciliation in the country."

Over 5,000,000 copies of Oxford group books were distributed during World War II in Great Britain alone.

Moral Rearmament was defined by Buchman as "the answering ideology, the overarching philosophy that will answer global selfishness, fear and greed, and unite the world."
(F. N. D. B.)

Oxford University

See EDUCATION.

Paasikivi, Juho Kusti

Paasikivi (1870-), Finnish statesman, was born Nov. 27, 1870, at Tampere, Finland. He studied law at Finnish, Swedish and German universities, was a law instructor in Helsinki university, 1899-1902, and then went into the banking and insurance business. In 1907, he entered politics as a member of the Finnish diet and the following year he became minister of finance in the semi-autonomous government of the grand duchy of Finland. After the Russian revolution and Finland's declaration of independence, Paasikivi headed the Finnish delegation that signed the treaty of Dorpat on Oct. 14, 1920; this action ended Finland's first war with the soviet union and

established its existence as an independent nation.

During Soviet-Finnish negotiations in 1939, Paasikivi was recalled from his post as Finnish minister to Stockholm to head another Finnish delegation which sought to negotiate a peaceful settlement of the soviet union's territorial demands. His mission ended in failure, however, and the following month, soviet troops invaded Finland, touching off the Russo-Finnish war of 1939-40. After the end of this "winter war," Paasikivi again headed a Finnish peace delegation that went to Moscow and there signed the peace of March 13, 1940. He was subsequently appointed Finnish minister to Moscow, staying at his post until Finland joined the Germans in the axis invasion of the U.S.S.R. that started June 22, 1941. For the following three years, Paasikivi was virtually retired from politics, but on the defeat of his country, he was called back in Nov. 1944, this time as prime minister, because Paasikivi was then considered the only statesman able to negotiate with the soviet diplomats. Following Baron Carl Gustav von Mannerheim's retirement as president of Finland Paasikivi was elected his successor, on March 9, 1946.

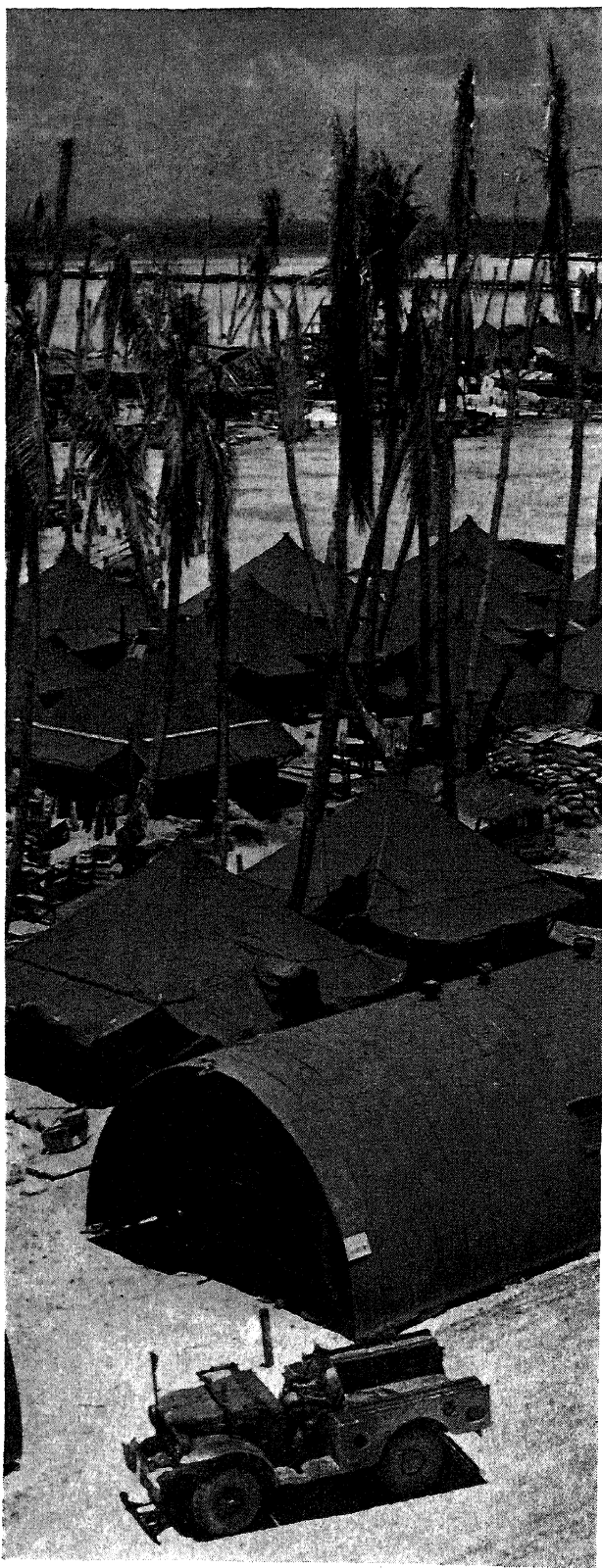
Pacific Islands, British

Under this heading are described the British crown island colonies and native protectorates in the Pacific.

Fiji.—Crown colony, comprising all islands, rocks and reefs lying 18° S. and 178° E. There are about 250 islands, 80 inhabited. Area: 7,083 sq.mi.; pop. (est. 1937) 205,397, (est. 1940) 220,787, (est. 1945) 254,676 including 5,277 Europeans, 115,724 Fijians, 117,256 Indians, 2,490 Chinese, 5,909 persons of mixed European and native descent, 3,432 Rotumans, 3,146 Polynesians and 1,442 others. Chief towns: Suva on Viti Levu (cap., pop. 15,522 in 1936). Religion: Christian: Methodist 93,577; Roman Catholic 20,005 (1943). Governors of Fiji and high commissioners of the western Pacific: Sir Arthur F. Richards, (1936-June 26, 1938); Sir Harry C. Luke, (June 26, 1938-June 16, 1942); Major General Sir Philip E. Mitchell (June 16, 1942-Oct. 12, 1944); Sir Alexander Grantham (after Oct. 12, 1944).

A new constitution based upon letters patent issued by the British government on April 2, 1937, became effective on the dissolution of the old legislative council on June 13, 1937. The old semirepresentative system was abolished and a purely nominative system substituted. The colony was henceforward administered by the governor assisted by an executive council comprising the governor and five official members and two unofficial members nominated by the governor. The legislative council consisted of the governor and 16 official members, plus five Europeans (three elected and two nominated), five Fijians (nominated), and five Indians (three elected and two nominated). The European and Indian population was directly controlled by the governor's administration, though in each of the 11 Indian districts there was an Indian advisory committee with considerable authority. The Fijians enjoyed a fair measure of local self-government under a system of village and district councils, which was extended in 1944 by the substitution of a Fijian affairs board for the native regulations board. The Fijians administered their own revenue and made all Fijian appointments with the exception of Rokos (high chiefs) and magistrates. In 1940 a native land trust board was created to protect the interests of natives by reservation of land for their needs.

In 1941 and 1942 the threat of Japanese invasion hung over the colony, and the military forces were greatly ex-



Betio Island, where some of the fiercest fighting in the Gilberts took place early in 1944, after U.S. troops had repaired the ravages of battle. Only the broken trees remained as evidence of the heavy bombardment of the island

panded. Many units distinguished themselves in the campaigns in the Solomons. Taxation was heavily increased after 1941, and the output of rubber was stepped up to aid the Allied war effort. In 1943 a strike by Indian labour in the sugar industry held up production and was bitterly

resented by both British and Fijians.

On the whole the constitution of 1937 had reduced political friction, but there were inevitably some signs of discontent under the existing system. In Aug. 1943 a body known as the European electors' association introduced a motion in the legislative council which aimed at abolishing the system of nominated unofficial members in the council, thus giving the electors a greater measure of control. This motion was defeated. Similar demands were made by representatives of the Indian community. In July 1946 hostility among Europeans and Fijians and Indians was reflected in an acrimonious debate in the legislative council on the subject of "Fiji for the Fijians."

Gilbert and Ellice Islands Colony.—This comprises the Gilbert group, Ellice Islands and Phoenix Islands. These three groups form a rough triangle the approximate position of the vertices of which are: Gilbert Is., 1° S. and 175° E.; Phoenix Is. 4° S. and 171° W.; Ellice Is. 8° S. and 175° E. Area: 345 sq.mi.; total pop.: (est. 1940) 34,202; Gilbert Islands 26,180; Ellice Islands 4,613; Phoenix Islands c. 300; Fanning Island 255; Washington Is. 99; Christmas Is. 11 and Ocean Is. (1938) 2,744. Religion: Christian.

In 1937 and 1938 the islands of the Phoenix group sprang into prominence because of the development of transpacific aviation. Both the United States and Britain needed bases here, and on Aug. 21, 1937, three uninhabited islands near Pitcairn were annexed for Great Britain by a naval landing party; on March 6, 1938, President Franklin D. Roosevelt signed an executive order taking over Canton and Enderbury in the name of the United States. It had always been assumed in London that the whole of the Phoenix group belonged to Britain even if not formally occupied, whereas the United States held that sovereignty depended on occupation. These differences were resolved on Aug. 10, 1938, when the two governments agreed that an Anglo-U.S. condominium should administer Canton and Enderbury for 50 years and "thereafter until such times as it (the agreement) may be modified or terminated by mutual consent." The air companies of both countries had equal rights to the facilities of these islands. Canton became a Pan-American fuelling station and the Honolulu-Canton-Nouméa service began on July 10, 1940.

In 1941 the native government ordinance set up a native land court to deal with the simpler of the land claims, the legacy of the wars which preceded the advent of British rule. Some measure of legislative, executive and minor judicial powers were also vested in the native local councils.

The Gilbert Islands (*q.u.*) of Butaritari (Makin), Mara-kei and Abaiang were occupied by the Japanese on Dec. 9, 1941, Tarawa and Abemama in Jan. 1942, and Ocean Island on Aug. 10, 1942. The treatment meted out to the islanders by the Japanese varied in the islands but was particularly bad in Ocean Island. Generally the food situation was poor, but health remained surprisingly good. Education was handicapped by lack of supplies and European staff but was somehow carried on. Copra, normally used as currency for the payment of land tax, was destroyed or allowed to deteriorate, while the land tenure system itself became completely disorganized.

Tarawa, Butaritari and Abemama were recaptured by U.S. forces on Nov. 20, 1943, after a bitter and costly battle, and British rule was re-established. There was later a certain amount of unrest in Butaritari and Tarawa, largely owing to the demoralizing influence of the Japanese occupation. In Oct. 1944 proposals for future government of the colony were promulgated by the high commissioner.



Wading ashore under fire from Japanese machine guns on their right flank, U.S. infantrymen are shown advancing on Makin atoll in the Gilbert Islands during the invasion of Nov. 20, 1943

These aimed at ultimate self-government and specified that no European or foreigner should be appointed to a post for which an islander was fitted or could be trained.

British Solomon Islands.—A protectorate situated between 5° and 12° 30' S. and 155° and 165° E. Area: c. 11,458 sq.mi.; pop. (1937) 94,094 including 478 Europeans, 89,568 Melanesian, 3,847 Polynesian and 192 Chinese.

From early 1942 until the end of 1943 a bitter campaign was fought in the Solomon Islands (*q.v.*). The Japanese had established bases at Tulagi and Guadalcanal which were constantly attacked by U.S. and Australian naval and air forces. By Nov. 1943 almost all the Japanese in the Solomons had been driven out. Not all the islands had been occupied, and the British administration had continued functioning in Malaita and San Cristobal, working side by side with the United States military authorities. As

the campaign drew to a close and the U.S. forces withdrew, British officials returned to the liberated islands to begin the work of rehabilitation.

New Hebrides.—Condominium of Great Britain and France, situated 17° S. and 160° E. Area: c. 5,700 sq.mi.; pop. (est. 1942) 43,008 including 40,000 natives, 144 British and 710 French. (*See PACIFIC ISLANDS, FRENCH.*)

Tongan Islands.—Monarchy and British protectorate situated 20° S. and 175° W. Area: c. 250 sq.mi.; pop. 1937 census: 32,861; (est. 1942) 39,200 including 300 Europeans and 38,000 Tongans. Capital: Nukualofa. Religion: Christian: Wesleyan 21,400; Free Church of Tonga 7,050; Church of Tonga 4,000; other Protestants 1,700; Roman Catholic 5,000. The queen of Tonga: Salote Tubou; prime ministers: Prince Uliame Tugi (1937–1941); High Chief Ata (after 1941).

The prince consort and premier, Uliame Tugi, was created a commander of the British empire in the New Year's honours list of 1937. During World War II a Tongan de-

Pacific Islands (British): Statistical Data
1938

Item	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
		1£ = \$4.889		1£ = \$4.032		1£ = \$4.035
Exchange Rate						
Fiji						
Finance						
Government revenues	£890 (\$4,349)		£1,273* (\$5,136)		£1,567 (\$6,321)	
Government expenditures	£967 (\$4,728)		£1,153* (\$4,651)		£1,454 (\$5,868)	
National debt	£1,575 (\$7,699)		£1,575* (\$6,354)		£1,858 (\$7,499)	
Transportation						
Highways		666 mi.				
Minerals						
Gold		92,361 oz.		118,680 oz.		40,443 oz.
Silver		12,380 oz.		30,383 oz.		9,619 oz.
Crops						
Sugar		150,545 tons				
Copra		38,731 "				
Rice		10,080 "				

Pacific Islands (British): Statistical Data (continued)

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Fiji (continued)						
Sea products						
Trochus shell		157 tons				342 tons
Turtle shell		1,095 "				...
Exports						
Total	£2,535 (\$12,395)	...			£1,809 (\$7,301)	...
Sugar (raw)	£1,338 (\$6,543)	151,000 tons			£933 (\$3,765)	75,000 tons
Gold bullion	£701 (\$3,429)	98,000 oz.			£384 (\$1,550)	45,000 oz.
Copra	£271 (\$1,325)	37,000 tons			£382 (\$1,542)	21,000 tons
Imports						
Total	£1,676 (\$8,192)	...			£2,330 (\$9,402)	...
Drapery	£183 (\$894)	...			£612 (\$2,470)	3,250,000 sq.yd.
Machinery	£174 (\$850)	...			£74 (\$299)	...
Oil	£104 (\$507)	5,383,000 gal.			£130 (\$524)	6,764,000 gal.
Education						
Schools				417†		
Students				31,530†		
GILBERT AND ELLICE						
Finance						
Government revenues	£70† (\$344)		£47 (\$189)			
Government expenditures	£73† (\$357)		£69 (\$278)			
Minerals						
Phosphate of lime	£166 (\$812)	333,635 tons				
Crops						
Copra		9,924 tons				
Exports						
Total	£224† (\$995)					
Phosphate	£166† (\$737)					
Copra	£56† (\$250)					
Imports						
Total	£143† (\$632)					
Machinery	£13† (\$57)					
Meat	£10† (\$45)					
Rice	£8† (\$37)					
Education						
Schools		236†				
Students		6,828†				
NEW HEBRIDES (Condominium with France)						
Finance						
Government revenues	£28 (\$135)		£23† (\$87)			
Government expenditures	£24 (\$117)		£23† (\$90)			
Crops						
Cocoa		2,094 tons§				
Coffee		441 tons				
Forest products						
Sandalwood		88 tons§				
Sea products						
Trochus and Burghaus shell		86 tons§				
Exports						
Total	£120 (\$588)	16,075 tons				
Copra	£75 (\$366)	12,822 "				
Cocoa	£28 (\$139)	2,120 "				
Coffee	£13 (\$63)	695 "				
Imports						
Total	£112 (\$547)	...				
Building materials	£10 (\$47)	...				
Rice	£8 (\$41)	...				
Benzine (petrol)	£7 (\$35)	...				
TONGA						
Finance						
Government revenues	£55 (\$270)		£59* (\$238)		£112 (| (\$453)	
Government expenditures	£50 (\$244)		£73* (\$296)		£86 (| (\$345)	
Exports						
Total	£77 (\$377)	...	£52† (\$201)	...	£202 (| (\$815)	...
Copra	£72 (\$352)	14,000 tons	£37† (\$142)	8,000 tons	£165 (| (\$665)	9,000 tons||
Bananas	£3 (\$14)	11,000 cases	...	38,000 cases	£22 (| (\$90)	36,000 cases||
Bêche-de-mer	† (\$1)	4 tons	...	...	...	...
Imports						
Total	£66 (\$323)	...	£64† (\$246)	...	£223 (| (\$897)	...
Drapery	£8 (\$40)	...	...	...	£49 (| (\$199)	...
Flour	£6 (\$30)	...	...	...	£29 (| (\$118)	...
Meats (tinned)	£6 (\$29)	...	...	...	£23 (| (\$93)	...
Education						
Schools				125†		
Students				9,324†		
Exchange rate						
Great Britain		£A 1.25 = £1		£A 1.27 = £1		
United States		£A1 = \$3.895		£A1 = \$3.192		

*1942. †1940. ‡1939. §Exports only. ||1945. ¶£205.

fense force was raised by volunteers and did well in the Solomons. Substantial gifts were made to the Red Cross and other funds, and Tonga presented two Spitfires to the British government.

Pitcairn Island.—British colony, situated between 25° 3' S. and 130° 8' W. Area: 2 sq.mi.; pop. (1943): 177. (See also WORLD WAR II.)

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Pacific Islands, French

The French territories in the Pacific comprise archipelagos scattered over thousands of miles in the tropical zone of the southern hemisphere between Central America and the Australian continent. The most important of these islands are New Caledonia (capital: Nouméa), Tahiti (capital: Papeete), and the New Hebrides (main post: Vila), the last-named a Franco-British condominium. In 1937 the territories had a population of 160,000 composed as follows:

	Europeans		Natives	Total
	French	British		
New Caledonia and dependent islands	16,000	—	44,000	60,000
French Oceania (Tahiti)	1,500	—	45,000	46,500
New Hebrides	766	234	52,000	53,000

Economic Aspects.—New Caledonia's wealth consists in its nickel and chromium mines, of which the first exported an annual average of 8,107 short tons, the second an annual average of 62,527 short tons, during the seven years 1939–45.

Other exports were copra, coffee and cotton. Local meat canneries produce canned meat from cattle bred on the islands.

French Oceania (Tahiti) continued to draw its resources mainly from copra (annual export average, 1939–45, 17,945 short tons), vanilla, mother of pearl and phosphates (annual export average, 1939–45, 208,151 short tons). The following table summarizes foreign trade figures (quantities) for the period 1937–45 inclusive (in short tons, 000s omitted):

	1937	1938	1939	1940	1941	1942	1943	1944	1945
<i>New Caledonia:</i>									
Imports	157.7	203.3	245.3	198.0	177.6	153.3	225.9	203.0	168.3
Exports	112.2	103.4	221.1	329.3	202.4	106.4	56.4	28.2	62.8
<i>Oceania (Tahiti):</i>									
Imports	24.2	24.2	26.4	17.4	16.0	17.7	13.7	33.5	34.7
Exports	112.2	148.5	202.4	198.7	228.3	199.6	240.1	246.2	275.0

These figures reflect two factors which counteracted each other during the period, viz., (1) the temporary isolation of these territories from their French markets during World War II and (2) the role played by them as military bases after they had joined the Allies, in the early autumn of 1940.

Political Organization.—In 1937, New Caledonia formed a colony administered by a governor, a privy council and a general council. In addition, Nouméa had its own municipal council, and there were various municipal commissions in the interior of the island. In 1940 the general council was for a time brushed aside, but a decree of July 5, 1944, re-established it together with the privy council. After Oct. 21, 1945, New Caledonia was represented in the French (metropolitan) parliamentary assembly by one deputy (ordinance of Aug. 22, 1945).

The French establishments in Oceania (Tahiti) were, in 1937, administered by a governor assisted by economic and financial delegations. In 1946 these territories possessed a privy council and a representative assembly elected by universal direct suffrage. After Oct. 21, 1945, they were represented in the French (metropolitan) parliamentary assembly by one deputy (ordinance of Aug. 22, 1945).

The Franco-British condominium over the New Hebrides (*see* PACIFIC ISLANDS, BRITISH) was based on the Franco-British protocol of Aug. 6, 1914. The co-sovereignty of the two powers took the form of joint control and protection of the population of the island group, natives and immigrants, neither of the two powers enjoying exclusive advantages.

Role During World War II.—In the French possessions of the Pacific the shock produced by the defeat of the Allied armies and the capitulation of France in June 1940 was felt as strongly as elsewhere in the world. These territories decided to continue in the war, to contribute to the liberation of France as much as was in their power, and to preserve for the Allies a zone of the greatest strategic importance at a time when the coming conflict with Japan could already be foreseen. They joined the Free French movement officially on Sept. 2, 1940.

In relation to their small population the economic effort of the territories was considerable during World War II. Their military effort produced the dispatch to Africa of the *Bataillon du Pacifique* which fought in Libya and at Bir Hachém (June 1942). More than 150 sailors joined the ships of the Free French navy. Other islanders served in the Free French air force, after training in the royal air force.

Strategically, the French territories in the Pacific were of first-rate importance. The Japanese offensive extended into the neighbourhood of the New Hebrides which, like New Caledonia, became forward bastions of the Allied armies, both for defensive and offensive purposes. On March 9, 1942, General Alexander M. Patch arrived at Nouméa. On March 14, 1942, the first 30,000 U.S. troops disembarked on New Caledonia, where the general commanding in the South Pacific established his headquarters. The fleet which won the victory of the Coral sea sailed from Santo Island (New Hebrides), and the planes which bombed the Japanese in the Solomon Islands, there to halt their advance, took off from Pecoa airfield.

In 1946 New Caledonia experienced economic difficulties consecutive to wartime developments, in particular shortage of labour (previously imported from Indonesia and Indo-China) and of coal because of strikes in Australia. Hence there was a slowing-down of nickel and chromium mining operations. On Tahiti, however, industrialization continued to progress (sugar refineries, rum distilleries). The direct representation of the Pacific territories in the French parliamentary assembly, never hitherto conceded, had favourable repercussions on the political climate of the islands.

(*See also* SOLOMON ISLANDS.)

(M. Mt.)

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Pacific Islands, Mandated

The Pacific mandated islands are those taken from Germany and mandated to Japan under Article 119 of the treaty of Versailles following World War I. They included "all the Pacific islands north of the equator where the German flag was flown in 1914." They comprised the Marshalls, the Carolines, including Yap and Palau, and the Marianas with the exception of Guam, which the United States had held after its victorious war with Spain in 1898. In violation of provisions of the mandate, Japan fortified the islands, in comparative secrecy, after withdrawing from the League of Nations. The rising empire of Nippon kept the rest of the world in the dark about the nature and extent of such fortifications, prohibiting visitors and restricting Christian missionaries to non-strategic atolls.

After the bombing of Pearl Harbor and the subsequent seizure of Guam (*q.v.*), these three island groups gave the Japanese imperial navy a 2,000-mi. chain of "anchored aircraft carriers" sweeping in an arc from the home islands to the shipping lanes between Hawaii and Australia. Throughout the early part of World War II, these islands, used as air, submarine and naval bases, made supply and troop movements from the United States to the Southwest Pacific extremely hazardous.

However, the number and wide expanse of these scattered points of land in the vast Pacific proved a liability to the Japanese as Allied forces took the offensive, the Nipponese being unable to maintain sufficient forces at all points for adequate defense against concentrated attacks. Allied island-hopping strategy singled out principally Eniwetok and Kwajalein in the Marshalls, Palau and Ulithi in the Carolines and Saipan, Tinian and Iwo Jima in the Marianas as stepping stones to the Land of the

Rising Sun. Other islands were kept neutralized by frequent bombing and shelling and were by-passed to "die on the vine." Japanese forces resisted with such fanaticism that few escaped and few were taken alive. Only the atoll and anchorage of Ulithi was surrendered without resistance, the Japanese evidently having insufficient strength available to make a stand there. Losses by the Allies (almost 100% U.S. forces) were heavy, despite unprecedented concentrations of bombing and fire power in softening up each island preceding a landing. Among the strong points by-passed by the Allies were Truk and Yap, both of which surrendered after the end of the war.

With the exception of Saipan and Tinian, where Japan had developed extensive sugar plantations and refineries, the commercial value of the mandated islands was negligible. In fact (with the exception of Guam, which was not one of the mandated groups), few persons other than military and naval strategists even knew of the existence of the hundreds of atolls dotting the central Pacific.

Japan encouraged emigration from Okinawa and from over-crowded Honshu to many of these islands, and as the Japanese influx grew the native population decreased. During the generation ending about the time of the outbreak of World War II, the native population of the Carolines, which had stood at about 50,000 for a century, dropped to an estimated 40,000. The population of Yap, one of the Carolines, had dropped from 13,000 in early Spanish times to about 4,000 in 1939. Disease, limited diet, sex perversion and witch-doctor care of the sick, as well as huts that remained damp throughout the rainy season, were believed to be principal causes of the decrease on this particular island. Elsewhere, native losses were recorded but to a lesser degree than on Yap.

The Japanese instituted a medical program for all the mandated islands, especially against communicable diseases, and education in sanitation and health had made some progress at the outbreak of the war. Elementary education, though very limited, was instituted by the Japanese primarily as an aid to health education.

While commerce between the islands (excepting the Marianas) was of little volume and value, the Japanese had established, during the 1930s, small dairies on Yap, Truk, Panope and Palau and had given some agricultural aid to

natives where the nature and area of tillable soil made agriculture promising.

In the taking of Saipan and Tinian, the sugar industry, which had employed most of the 30,000-40,000 inhabitants and produced as much as \$6,000,000 worth of sugar for export in 1937, was completely destroyed, as air fields, roads, hospitals, repair and supply dumps and living quarters spread over nearly every acre of ground. In the larger islands of all the mandated archipelagoes, thousands of Okinawans and Japanese were returned to their native lands, and many of the remaining peoples were employed by the armed forces of the United States.

Specially trained U.S. staffs were sent to the islands under the military government to help restore damaged property, improve the health and sanitation of the natives, to aid them in establishing self-governing communities, to establish an educational program adapted to their needs and capabilities and to improve their agriculture and island industry, including handicrafts.

All the islands formerly mandated to Japan were placed under exclusive U.S. strategic trusteeship by unanimous vote of the United Nations security council on April 2, 1947. The United States was given full administrative powers and the right to fortify the islands (comprising a total area of 846 sq.mi.).

Eniwetok and Kwajalein in the Marshalls and Saipan (with Guam) in the Marianas became main points on transpacific commercial and military airways almost immediately after the end of the war. But it was clear that the principal value of the mandated islands in the future, as in the recent past, was considered by all nations to be military rather than commercial. (See also CAROLINE ISLANDS; MARIANAS ISLANDS; MARSHALL ISLANDS.)

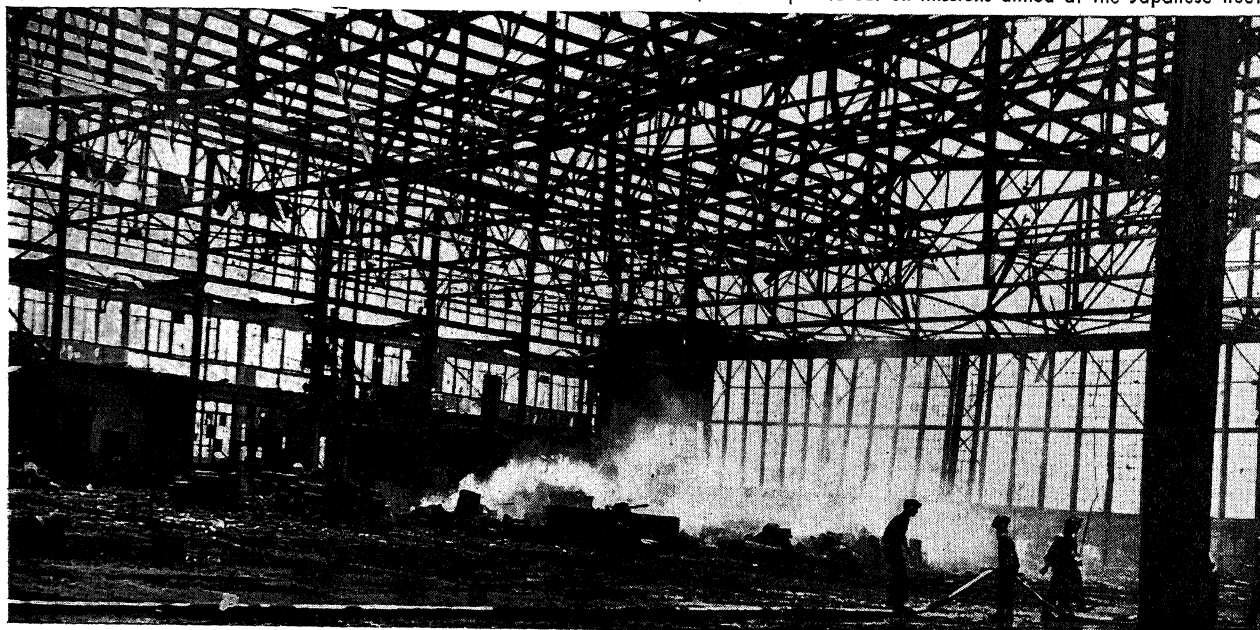
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(U. CE.; R. H. Ws.)

Pacific Islands, U.S.

After 1935 there was much activity in the Pacific ocean by the great powers to complete their somewhat tenuous

Hangar for shore-based planes on Midway smouldering after a Japanese air raid in 1942. The hangar was empty at the time of attack, with all planes out on missions aimed at the Japanese fleet



claims to certain strategically located islands. It was considered by perhaps the majority of international lawyers that mere discovery of an island was not sufficient to give title to the discovering power. Actual possession together with a settlement on or some actual use of the island was considered necessary to complete the title in the discoverer.

Of the small unpopulated Pacific islands owned by the United States, many had long been recognized as United States territory. The following small islands, which by presidential executive order were placed under the secretary of navy for purposes of administration, are in this category.

Midway.—Midway consists of two small islands, plus numerous islets, surrounded by a coral reef five miles in diameter. These two islands are known as Sand and Eastern Islands and comprise 750 and 328 ac. respectively. In 1935, Midway became a regular stopover point for transpacific flights.

During World War II, the Japanese made two efforts to seize Midway. The first attempt was on the fateful day of December 7, 1941, and the second attempt culminated in the great battle of Midway in June 1942 which marked the turning point of the war. (See MIDWAY ISLANDS.)

Kure.—Only 56 mi. northwest of Midway lies Kure or Ocean Island. This coral reef encloses a lagoon in which are two tiny islets, Sand and Green, which together comprise about 500 ac. of land area. Kure was originally discovered by a U.S. citizen, but the record is not clear as to who was the first to do so. Between 1874 and 1891 it was taken possession of for the kingdom of Hawaii and came to the United States upon the annexation of Hawaii in 1898.

Wake.—Wake Island, probably the most isolated island in the Pacific, lies about halfway between Midway and Guam. The atoll consists of three islets, Wilkes, Peale and Wake, arranged in a horseshoe shape, separated by narrow shallow channels, enclosing a lagoon approximately four and one-half mi. long. After 1935, in addition to its function as a cable station, Wake Island was used as a base for commercial transpacific flights.

Wake Island was an early objective of the Japanese upon the outbreak of war in the Pacific. The assault began on Dec. 8, 1941, but it was not until December 22 that the gallant defenders of Wake Island were finally overpowered by overwhelming numbers. (See WAKE ISLAND.)

Johnston.—Johnston Island was originally discovered by H.M.S. "Cornwallis" on Dec. 14, 1807, and named after her captain, Charles James Johnston. On July 27, 1858, the island was claimed by the kingdom of Hawaii. It was then leased to private individuals for purposes of exploiting the guano deposits. Upon the annexation of Hawaii, Johnston Island became a possession of the United States.

Johnston Island, 600 mi. southwest of Hawaii, is only about 1½ mi. long by ½ mi. wide. It is considered a native bird sanctuary.

Sand.—A few miles northeast of Johnston Island lies Sand Island. This tiny island is only about 500 yd. wide and is also used as a bird sanctuary. It is considered by many as forming a part of Johnston Island inasmuch as it lies within a large coral reef which surrounds both Johnston and Sand Islands. It also came to the United States upon the annexation of Hawaii in 1898.

Kingman Reef.—Kingman reef had the distinction of being the smallest land area over which the United States had sovereignty at the end of 1946. It is approximately

150 ft. long and 120 ft. wide at high tide. Two other islets in this V-shaped atoll appear at low tide. Including submerged shoals the reef is about 8 mi. long by 5 mi. wide. The lagoon formed by the reef was used by commercial air lines until the better facilities on Canton Island became available in 1939. Kingman reef is approximately 1,000 mi. south of Hawaii along the route to Samoa and New Zealand. It was discovered by Captain W. E. Kingman of the "Shooting Star" in Nov. 1853.

Palmyra.—Palmyra, 30 mi. south of Kingman reef, is a U-shaped atoll comprising 53 islets totaling about 500 ac. in area and surrounding a lagoon about 5½ mi. long and 1½ mi. wide. It is probably the most beautiful of all the U.S. Pacific islands.

Captain F. A. Sawle, a U.S. citizen, discovered the island on Nov. 7, 1802, and named it for his ship, the "Palmyra." The American Guano company also filed bond in 1860 under the Guano act of 1856, claiming the island for the United States. Notwithstanding these claims the kingdom of Hawaii in 1862 granted one Zenas Bent authority to take possession of the island on behalf of King Kamehameha IV. In 1889 the British, finding the island unoccupied, laid claim to it. When the United States annexed Hawaii in 1898, however, it specifically included Palmyra Island.

Baker, Howland, Jarvis.—It was not until May 13, 1936, that the United States perfected its claim to Baker, Howland and Jarvis Islands when Pres. Roosevelt placed these islands under the control and jurisdiction of the secretary of the interior for purposes of administration.

With the advent of long range over-water air transport the importance of these islands immediately became apparent. Howland and Baker Islands are on the great circle course from the United States to Australia and Jarvis Island lies along the route to Samoa and New Zealand. While none has a lagoon and is, therefore, not useful for seaplanes, all are flat and may be used by land planes. They also have value as meteorological stations. In March 1935 Baker, Howland and Jarvis Islands were colonized by Hawaiian-Americans thus bringing them under U.S. control.

Baker Island is rectangular in shape, having an area of approximately 1 sq.mi. with an elevation of 20 ft. It lies near the intersection of the equator and the international date line.

Howland lies a few miles to the north and is a low, flat, sand and coral atoll. It is approximately 1½ mi. long and ½ mi. wide with a maximum elevation of 18 ft. It was on Howland Island that Amelia Earhart was to land in 1937 on her ill-fated flight from New Guinea to Hawaii.

Several hundred miles to the east along the equator lies Jarvis Island, a very low bare coral plateau approximately 2 mi. long and 1½ mi. wide.

Canton and Enderbury.—The United States agreed to exercise sovereignty jointly with Great Britain over Canton and Enderbury Islands. These islands belong to the Phoenix group which, it is claimed, was discovered by U.S. whalers at the turn of the 18th century. Representatives of both the United States and Great Britain had alternately exploited the guano resources of these islands.

By coincidence, U.S. and New Zealand scientific expeditions chose Canton as the proper location from which to observe the total eclipse of the sun on July 8, 1937. More, however, than the eclipse was observed. Both were greatly impressed by a splendid lagoon on which seaplanes might land. In addition there was sufficient surface on the flat

coral rim surrounding it for land planes. Each expedition made a monument and displayed the flag of its nation.

On March 7, 1938, a U.S. party of seven colonists landed on Canton. There they found two British agents erecting a radio station.

After negotiation between Washington and London it was agreed in April 1939 that both Canton and Enderbury Islands would be under joint British and U.S. control for 50 years and thereafter until such time as the agreement might be modified or terminated by mutual consent. Air lines of both nations were to have equal rights to such facilities as the islands might offer.

Canton Island is the largest and most northern of the Phoenix group. It lies about 1,600 mi. southwest of Hawaii. The island consists of a narrow flat rim of land surrounding a large shallow lagoon, which is approximately 4 mi. wide. Enderbury lies about 35 mi. southeast of Canton. The island measures about 3 mi. long and 1 mi. wide and has an elevation of about 20 ft. (See also GUAM; HAWAII; PHILIPPINES, REPUBLIC OF THE; SAMOA, AMERICAN.)

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Pacific Relations, Institute of

See SOCIETIES AND ASSOCIATIONS.

Pacific War Council

See INTERNATIONAL ORGANIZATIONS.

Pacifism

The beginning of the decade 1937-46 clearly marked the end of one period and the beginning of another for pacifists and the pacifist movement throughout the world. The period when large numbers, especially among the youth of various countries, considered themselves pacifists and signed pledges never to take part again in war "for king or country" and when governments were not averse to having their policies described as "pacifistic," was over or rapidly drawing to a close. The period of the late '20s and early '30s had been marked also by popular and highly optimistic movements for universal disarmament and world organization for peace through the League of Nations.

The Spanish Civil War which broke out in the summer of 1936 had often been characterized as the beginning of World War II. That year saw a definite distinction growing up between various types who had participated in the struggles to abolish or prevent war without having thought their way through to a clear pacifist position—including those who opposed international wars as capitalistic or imperialistic but believed in class or revolutionary war, those who believed in defensive but not aggressive war and those who would participate in a war on behalf of collective security against aggressors—and, on the other hand, the pacifists proper who on religious, humanitarian, philosophical, political or other grounds refused insofar as they were free to determine their course to take any part in war. This was the case in Europe, Japan and China as well as in the United States.

The Product of 1914-18.—The pacifist movement which faced the onset of war was almost entirely the creation of World War I and the years immediately following. The Fellowship of Reconciliation with groups in 25 or more

countries, the War Resisters International with 54 affiliated sections in 24 different countries, the Women's International League for Peace and Freedom founded by Jane Addams, the National Council for the Prevention of War in the United States, were all founded in 1914 or later. The Peace Pledge union in Great Britain was founded by Canon H. R. L. Sheppard in 1934. The British and American Friends Service committees and their counterparts in other countries, the Brethren (Dunkards) Service committee and the Mennonite Central committee were similarly post-1914 products, pacifism even in the Historic Peace churches having been largely dormant in the decades before 1914 when it did not face a major test. Neither in the Roman Catholic nor the Protestant nor the Jewish churches, except in rare individual cases, had there been any awareness for a long time of the Biblical, early Christian and mediaeval pacifist heritage. In the orient Mohandas Karamchand Gandhi did not become a national figure in India until World War I, and he became a world figure, and of course the foremost modern pacifist, only after 1919. Toyohiko Kagawa, who had an immense influence on pacifism, especially in Christian circles throughout the world (though there was some question as to his exact position after World War II), likewise was a post-World War I figure.

In Great Britain and the United States these pacifist groups, though they were distinctly in the minority, for the most part experienced substantial growth in membership and activities in the years just before and during World War II. In these and other countries pacifists opposed the entry of their respective countries into the war to the end and laboured to increase the number of those who would take the conscientious objector's position once war was declared.

Pacifism remained a powerful factor, especially in the Protestant churches, in the two great English-speaking nations. A crucial moment was the Oecumenical conference in Oxford, 1937, which for the first time in the history of the leading Protestant bodies declared pacifism one of the positions Christians might hold in conformity with the Scriptures and the traditions of Christianity. Furthermore, the conference as a whole declared war to be "a defiance of the righteousness of God" and stated that "The Universal Church . . . must pronounce a condemnation of war unqualified and unrestricted." In contrast to the pre-1914 period the leading denominations all declared that if war came they would support individual members who on conscientious grounds refused to participate and they called upon governments to make the same provisions for such members as might be made for traditionally pacifist Quakers, Brethren and Mennonites.

Though exact comparative figures were difficult to obtain, the number of conscientious objectors in the two chief English-speaking countries was several times greater than in World War I. In the United States the number of Protestant ministers adhering to a definite pacifist position was 30 times as large.

The numbers and influence of pacifists were reflected in the treatment of conscientious objectors by the British and U.S. governments and in the general popular attitude toward pacifists and pacifist activities. The provisions for the former, especially in Great Britain, were far more liberal than in World War I and in neither country was there, save in very rare instances, the brutality at the hands of the military or prison officials which prevailed in the earlier war. Likewise, there was no such public hysteria against pacifists. When early in the war such hysteria threatened in England, William Temple, then

archbishop of York and unquestionably the foremost Protestant churchman of his day, made a ringing declaration that persecution of men for conscience' sake would mean that the English had themselves succumbed to nazism, which put a stop to any general trend toward hostility which may have existed.

It should be noted here that the pacifist groups which are being described and which had waxed in importance were predominantly middle class and religious in their orientation. For a variety of reasons, certainly including the influence of the Communist party after 1941, there was less antiwar sentiment and activity in labour and left-wing circles than in 1914-18. The labour and radical opposition to war policies in those years was a much more direct and formidable political threat than pacifist groups offered in World War II. This may, in part at least, have accounted for the fact that governmental policies were less harsh and oppressive.

Specific National Movements.—In Canada, except for the Doukhobors and Mennonites, the pacifist movement was small, but after the early stages of the conflict it experienced some growth. Governmental policy toward conscientious objectors was marked by moderation. In South Africa, Australia and New Zealand the pacifists were few in number and government policy was less liberal.

In continental European lands pacifist groups were relatively weaker before World War II than in Great Britain and the United States. There was virtually no provision for alternative civilian service for conscientious objectors. For several years during the war contact between pacifists in these countries and their British-U.S. fellows was broken. These contacts were restored in the postwar period. In March 1946 the International Council of the Fellowship of Reconciliation convened in Stockholm, Sweden, with a dozen countries represented. In August a representative gathering of the Women's International League for Peace and Freedom was held in Luxembourg in the Netherlands. During the war religious pacifists in the war-ridden countries apparently earned general respect for a position which combined steadfast refusal to collaborate with foreign or native dictators and considerable material and spiritual aid to Jews and to the resistance forces, with an equally steadfast refusal to resort to hate and violence. Both governments and churches were calling them to responsible positions in the work of reconstruction.

It was practically impossible to obtain information about pacifists in the soviet union. No organized pacifist movement was possible. The laws against those who refused or evaded war service were extremely severe, but it was impossible to tell whether or not this argued for the existence of considerable numbers who opposed war on conscientious grounds.

After 1936 the pacifist movement was small in both China and Japan, especially in the former. Contacts with the west were just being restored in 1946. In Japan some groups survived and there were a number of conscientious objectors in the Japanese forces who if thrown into combat refused to shoot and died without attempting to defend themselves.

There was a nascent pacifist movement in Latin America at the end of the decade, including small groups of Quakers, Brethren and members of the Fellowship of Reconciliation and a communal settlement in Paraguay called Bruderhof.

The situation in India continued to be unique. The fact that the country achieved its independence chiefly under the leadership of Mohandas Gandhi and by nonviolent means added to the prestige of pacifism generally. The

number of Indians, however, who accepted Gandhi's religious pacifism and made a personal commitment to it had always been small. In spite of this, the Indian National congress adhered substantially to nonviolent methods. There were indications that elements with a more radical economic policy than Gandhi's and which did not subscribe to nonviolence wielded increasing influence.

Thus the modern pacifist movement, largely a product of World War I, emerged from its first great test. If the pattern of the '20s and '30s were to be repeated, it might be expected that there would be many additions to pacifist ranks from ex-soldiers who vowed "never again," but that movements for disarmament and world government in which nonpacifists predominated would tend to grow much more rapidly and would absorb the energies of many pacifists also. If men were more deeply convinced than ever of the futility and irrationality of war "now that



Home-made library built by U.S. conscientious objectors at Camp Patapsco, Md., in 1941

it had become total and atomic," there were also indications that they felt a profounder skepticism about the possibility of abolishing it. In western countries there were pacifists devoting their energies in the effort to develop mass movements for world government and general disarmament, convinced that catastrophe impended if this were not achieved in five or ten years after World War II. Others were convinced that nothing but a profound spiritual revolution could stay the forces of disintegration in modern life and that pacifists should concentrate, therefore, on converting more individuals to an outright renunciation of war and practice of a life which ruled out violence and would "suffer on behalf of evil doers" in accordance with "the teachings of Jesus." Among the latter were some who believed there was a chance (if a sufficient minority was won to an uncompromising Christian or pacifist position) that the masses might be caught up in the new current and a nation or nations might renounce war. Others believed this was utopian and that the real justification for making religious pacifists was that, like

the early Christians, they would keep themselves "unspotted from the world" and thus constitute the seed out of which eventually a new order might be born.

Attitude of the Churches.—Perhaps the crucial question was that of the churches' attitude on the issue of atomic war. The issue, so far as the Protestant churches were concerned, was clearly posed in two important documents issued by a commission of theologians under the auspices of the Federal Council of the Churches of Christ in America. The first was issued during the war in 1944 and entitled "The Relation of the Church to the War in the Light of the Christian Faith." Though the majority of these theologians were nonpacifists, they agreed that "the church dare not approve a supposition that military expediency of necessity can ever rightfully become the supreme principle of human conduct." Some of the signers of the report believed, however, that certain measures, "such as rigorous blockades of foodstuffs essential to life and obliteration bombing of civilian areas, however repugnant to humane feelings, are still justifiable on Christian principles if they are essential to the successful conduct of a war that is itself justified." They warned, however, that even this should not be taken as making "military necessity" supreme. Under no circumstances could the church acquiesce "in the view that modern war may properly, even in case of extreme peril to nation, church, or culture become total war."

In the spring of 1946 substantially the same group of theologians made a report which the Federal Council of Churches published for study on "Atomic Warfare and the Christian Faith." In this document the theologians announced: "We are agreed that, whatever be one's judgment of the ethics of war in principle, the surprise bombings of Hiroshima and Nagasaki are morally indefensible." They added further that "the policy of obliteration bombing as actually practiced in World War II is not defensible on Christian premises."

It appeared from the report that some of the members of the commission had now moved, or were moving, toward the position that obliteration bombing and atomic bombing could under no circumstances be justified on ethical or Christian grounds and that "the atomic bomb has revealed the impossibility of a just war." Consequently, they held that "the necessity for repudiation of all support of war by the church" had been demonstrated.

Others in the group, however, though agreeing "that what has been done is wrong, and that it would be wrong for any nation in the future to take the initiative in using such measures for its own advantage . . . believe that the way should be left open to regard the use of atomic weapons under some circumstances as right." For under present circumstances "if plans for international control of aggression should fail, the only effective restraint upon would-be aggressors might be fear of reprisals," and this possible restraint "should not be removed in advance."

A substantially similar position was taken in a statement issued later by British Protestant theologians. It was clear that discussion on both the practical and the ethical implications of the position here taken would have to proceed in the Protestant churches. Whatever its outcome, this discussion was certain to have a profound effect upon the future of Protestantism.

In the immediate postwar period there were as yet no indications that a comparable discussion had been undertaken in Roman Catholic circles. There were, however, isolated voices, including those of leading lay writers,

which were proclaiming that indiscriminate and "total" atomic war could not possibly meet the requirement of a "just" war as laid down by the church, and that since no conceivable modern war could now meet these standards, Roman Catholics must necessarily be conscientious objectors.

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Packaged Fuel

See FUEL BRIQUETTES.

Packing Industry

See MEAT.

Pact of Munich

See CZECHOSLOVAKIA; FRANCE; GERMANY; GREAT BRITAIN AND NORTHERN IRELAND, UNITED KINGDOM OF; ITALY; WORLD WAR II.

Padilla, Ezequiel

Padilla (1890–), Mexican statesman, was born on Dec. 31, 1890, in Coyuca de Catalan, Mex. He studied law in Mexico and abroad, fought under Pancho Villa in the revolution of 1914 and fled the country after Villa's defeat in 1916. Returning to the country, he served his first of three terms as federal deputy in 1922. He twice held office as senator and in 1926 received an appointment as professor of law at the University of Mexico. He was also attorney general of the republic in 1928, secretary of public education in 1929 and minister to Hungary and Italy from 1930 to 1932. When Manuel Avila Camacho was elected president in 1940, he made Padilla his foreign minister. A skilled diplomat, he was outspokenly anti-axis and urged a firm policy of hemispheric solidarity. Immediately after the Japanese attack on Pearl Harbor Mexico severed diplomatic relations with Tokyo. When the axis powers ignored Padilla's protest against the submarine sinking of Mexican ships, the Mexican chamber of deputies declared war on Germany, Italy and Japan on May 29, 1942. Elected president of the Inter-American conference in Feb. 1945, Padilla attended the San Francisco conference of that year. He resigned the foreign ministry in July and was nominated for the presidency by the Mexican Democratic party in Nov. 1945. Padilla was defeated by Miguel Alemán in the presidential elections of July 1946.

Paget, Sir Bernard (Charles Tolver)

Sir Bernard Paget (1888–), British army officer, was born Sept. 15, 1888, son of the bishop of Oxford. Educated at Shrewsbury school, he served in World War I as a brevet major and was awarded the distinguished service order, the military cross and the Italian silver medal for military valour. He was commandant of the Royal Staff college of Camberley, 1938–39. In May 1940 he di-

rected the successful withdrawal of a British force in the disastrous Norwegian campaign. That same month he was appointed chief of the general staff of British home forces. Gen. Paget was made commander in chief of the home forces on Nov. 18, 1941, and commander in chief of British forces in the middle east under Field Marshal Lord Wilson, then supreme commander of the Mediterranean (Dec. 27, 1943). In late May 1945 Gen. Paget was ordered by Churchill to intervene in the fighting between French troops and natives in the Levant.

Pahlavi, Mohammed Riza

Mohammed Riza Pahlavi (1919–), shah of Iran, was born Oct. 26, 1919, in Tehran. Educated in Switzerland, he was given thorough military training and commanded his own regiment while in his teens. In Sept. 1941 his father, Riza Shah Pahlavi, failed to comply with British and soviet ultimatums that he oust all axis nationals from Iran. As a result troops from both countries overran Iran and Riza Shah renounced the throne in favour of his 21-year-old son on Sept. 16, 1941. The young shah made few public statements, although he did declare, Dec. 31, 1943, that he approved the Allied Tehran declaration concerning Iran as the "first application of the principles of the Atlantic Charter."

Painting

If in future times someone tried to read the events of the decade 1937–46 from the paintings of that period, he

Pablo Picasso (seated centre left) with a company of friends in his studio. As an exponent of abstract art, he was one of the dominant influences on painting throughout the decade 1937–46

would probably arrive at the following conclusions: people who lived and created during those ten years were somewhat neurotically plagued by an increasing awareness of the motivating forces of their own egos, void of a common creed but bravely striving to rid themselves from outworn beliefs and empty forms. These people were working in an experimental mood because they did not really know what they were working for and they must have had much time on their hands to explore so devotedly the relations of colours and forms, of space and light and to invent or revive remote symbols. Viewed geographically, the occident must have been culturally divided between the central and eastern part, adherent to a strongly conservative cultural and aesthetic pattern, and the western part, characterized by a revolutionary and somewhat chaotic situation. Especially France must have been the most powerful state in the world, judging from the number of French pictures abroad.

These, approximately, may be the impressions gained from an examination of the artistic production of the decade. While they would not be totally wrong, they would not permit an immediate conclusion that the most terrifying of all wars had devastated for five years and more the surface of the earth, that political systems built for "a thousand years' realm" had collapsed, that resulting from it famine and mental despair had swept over the world and that complete uncertainty about the future of this planet had gripped innumerable minds. Little of these facts could be observed directly from the study of art.

This is stated here at the beginning in order to warn



against a cheap parallelism between art and the political-historical field. People are all too inclined to project into the art work what is already known from other sources and to dictate a uniformity of expression which is foreign to history. To believe that painting and sculpture, philosophy and poetry should, with necessity, reflect the happenings in the field of political history would presuppose man to be unfree, completely determined by the outside and make paintings merely an illustration of actions.

Seduced by such a mistaken belief in a complete parallelism of history and art, some have, for instance, projected the political decline of the Roman empire into its artistic production and seen in it nothing but the disintegration of classical beauty. While this was not completely erroneous, students learned to recognize in it rather the transformation of Hellenistic-Roman art into new styles such as Islamic art in the orient, Sassanian art in Persia, Byzantine and migratory art in Europe. Artistic production is a continuous process and it depends on the point of view chosen whether a phenomenon is seen as an expression of the decline of old forms or as an announcement of the rise of new concepts.

This example has been chosen in order to make clear that the sphere of artistic creation is half autonomous, is in advance or behind the other problems, has its own problems with its own evolutions and with its own rhythm of evolution. Only after this has been understood can people begin to isolate those factors in painting which can be used as a bridge between the history of the epoch at large and the history of art in general. This sociology of painting is not dealing with the most pertinent factor of art, which is the solution of its artistic problems, but it is an adequate one for a handbook on the general history of a certain period.

* * *

THE MOST APPARENT reflection of political history on the art of the period 1937-46 was the fact that the artist in the dictatorially governed countries, whether fascist or communist, was not free to express without restriction what seemed important to him. For the first time in history the censorship of the state was not only concerned with the subject matter, that is, the ideological content of an art work, but also with the style—the form in which ideas should or should not be expressed. The U.S.S.R. and Germany agreed in their official disapproval of abstract and expressionist art, with the result that the observer of the future would not find paintings of this type, so characteristic of the artistic production of the same period in the western democracies, in the exhibition catalogues or publications of those states. The reasons for such condemnation were, however, different: in Germany the advanced trends of modern painting were curbed first of all because Hitler, the amateur artist, disliked them, secondly, because the small businessmen and lower employees who constituted the rank and file of the Nazi party, once raised to power, could make their retarded cultural standards the official will of the state and finally because abstract and expressionist art were neutral toward or unconcerned about the political revolution of the country. Consequently, modern art was branded “Jewish,” “Asiatic,” “degenerate,” “subhuman.” The pictures of the leading artists of an antinaturalistic art, regardless of which nation, were taken down from the museum walls, sold at public auctions in Switzerland (with the result that many of them found a permanent place in U.S. collections) or toured in special

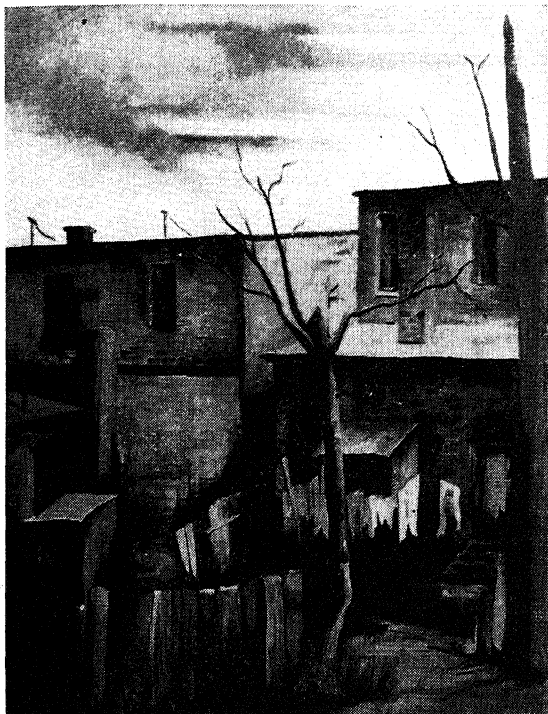
propaganda exhibitions through the country in order to make the people aware of the “degeneracy” of the pre-Hitler period. This last opportunity for seeing publicly works by such artists as Lionel Feininger, Paul Klee, Franz Marc, Emil Nolde, etc., was grasped eagerly by the more advanced public while it offered the aggressive elements an opportunity to join in with the official ridicule.

Some of the best modern artists like Kaethe Kollwitz (1863-1940) were not only forbidden to exhibit but interdicted to work. Jewish painters were excluded from the state-organized professional league and their works were eliminated from museums and exhibitions. Some of the leading painters of Germany and Austria fled their countries, unwilling to betray their human and artistic convictions, and created abroad. To name only a few: Max Beckmann went to Holland, Oscar Kokoschka to England, Feininger (although born in the U.S. but living most of his life in Germany) and George Grosz to the U.S. On the other hand, art was fostered which expressed a positive attitude towards the new state and its racial-biological philosophy in an academically correct form. Idyllic landscapes, representations of the workman, the soldier and the storm trooper, but most of all, nude men and women glorifying the Nordic race and stimulating the sense of propagation, rendered in a style of minute realism or academic generalization, abounded.

While in the U.S.S.R. at the beginning of the revolution until the middle '20s the most advanced forms of abstract art were put into the service of a new revolutionary concept of society, this attitude of the government was later reversed by Stalin. The different branches of abstract art were declared to be “formalism.” The task assigned to art in the Soviet republics was, primarily, to illustrate the positive aspects of the social revolution and to glorify the health and strength of the Soviet people. As the adequate style one considered the academic bravura manner which characterized Russian painting in the epoch between 1870 and 1900 and which found its most typical representatives in Ilja Repin and Wassili Wertschagin. Another group worked in an out-of-door impressionism, modified by broad poster-like effects, such as were typical for the handsome travel posters of Scandinavia. Perhaps the most advanced artists of this group, eulogizing the out-of-door sports, the army and women, was Alexander Deyneka. Other more advanced impressionists were S. V. Gerasimov, K. C. Petrov-Votkin, N. Kupreanov and V. Lebedew.

Both governments in fostering academic-naturalistic art turned the clock back artistically by from 30 to 50 years. Recognizing the academically correct and the nationally positive as the highest standards of value, they legalized the conservative. Consequently, future research would have to look for two arts in order to understand the period: the officially recognized art as displayed in public and the art of the “forbidden” masters as practised secretly in their studios or created abroad.

In Italy the official attitude was different. Since in fascism the will of the dictator was turned into the will of the state, it was of importance that Mussolini showed some understanding of the more advanced trends of contemporary art. He was personally acquainted with Filippo Marinetti, one of the leaders of the abstract futurist movement, who had joined the ranks of the early fascists. Marinetti's “Futurist Manifest” of 1910 contained those elements of dynamism which later found political release in the fascist movement. Consequently, there never existed a censorship in regard to style (or form) in Italy, and the “Biennale” in Venice, one of the largest international exhibitions in Europe, admitted freely every type of art.

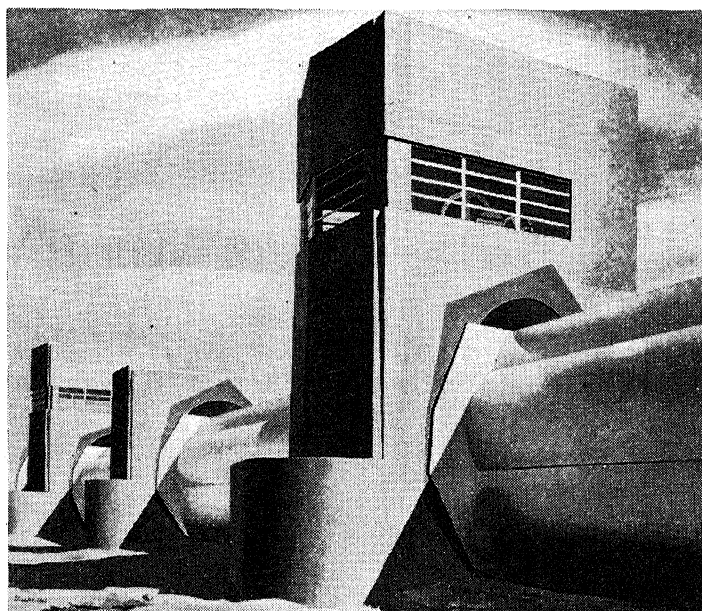


Above: Painting by Richard Preyer, 17, of the Woodberry Forest school, Va., which was awarded first prize in oils at the National Scholastic Art Awards exhibition in 1945



Above: "The Night Class" by Max Weber, whose exhibition in March 1941 was an outstanding one-man show of that year

Below: "Room 110" by Yasuo Kuniyoshi was awarded first prize at the Carnegie Institute's exhibition, "Painting in the United States, 1944"



Above: Charles Sheeler's painting, "Water," was awarded the Norman Wait Harris silver medal and prize in 1945 at the Chicago Art Institute's exhibition of American paintings

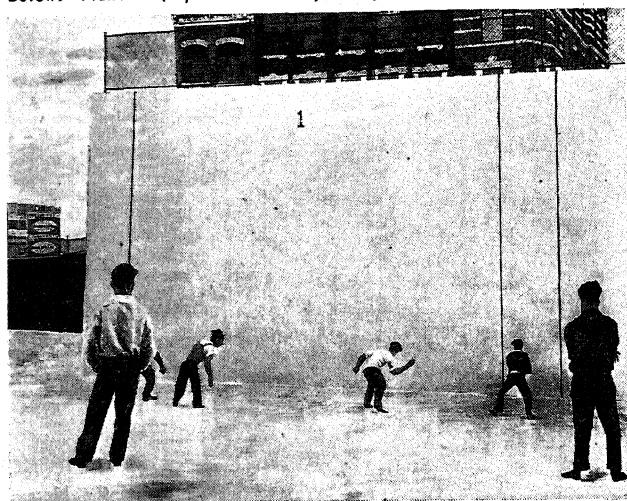
Below: "Invasion," by Thomas Hart Benton was one of a series of pictures which he painted in the months following the attack on Pearl Harbor





Above: "Defense of Petrograd" by A. Deyneka, from the exhibit "Artists of the Russian Socialist Federated Soviet Republic for 15 years"

Below: "Handball," painted in tempera by Ben Shahn during 1939



Above: "La Loge," completed by Georges Rouault in 1941, was included in the 1946 exhibit "Paintings from Paris" which was held at the Pierre Matisse gallery in New York city

Below: "Guernica," an oil painting by Pablo Picasso, on extended loan to the Museum of Modern Art in New York city. The canvas is dated May to early July 1937



Italian painters could, of course, not criticize pictorially institutions of their country nor express a "subversive" philosophy, but they were not limited in their manner of painting and only indirectly influenced in their choice of subject matter. But the absence of "problematic" themes was clearly noticed in the work of Carlo Carra, Felice Casorati and other of the leading painters.

Mexico was the only other country in which, although gradually receding, the impact of political life upon painting could be noticed. The concern with the national revolution and its aim of emancipating the Indian peon and the proletarian native city dweller was expressed by a continuous stream of frescoes which flowed forth after Diego Rivera and José Orozco began to work for the revolution in 1923. The revival of the Indian past, furthered by archaeological studies in which many artists took an active part, brought about an enrichment of form and content which made Mexican art a unique and forceful phenomenon.

The artists of the western democracies expressed the political events which transformed the globe during the decade by an individually chosen vantage point from which the artist either looked in the direction of the great conflagration or remained unconcerned. Official influence was not exerted and the self-evolution of the main themes of western painting was not disturbed. An important stimulus from government was given to painting in 1935 when the Works Progress administration's Federal Arts project was introduced in the United States. Part of the general program to counteract unemployment and stimulate production, it initiated a government-sponsored program for providing artists with workshops, tools and materials. More important, it provided the opportunity for murals and paintings to be executed in post offices, schools, government agencies, etc. This program brought about a revival of fresco painting, occasionally influenced by the style of the Mexican school, and directed the attention of the artist to the realities of the daily life and the scenery of his own country. Far beyond the material support, the WPA program represented one of the most far-reaching and fruitful cultural actions of any government in modern times. In bringing together artist and community it helped temporarily to bridge a gap which had been widening from the time the French Revolution broke the affiliation of the artist with court and church. How many of the artists charged with the task of monumental painting were able to find an original solution, or were even prepared for the merely technical problems, was another question.

* * *

WORLD WAR II called a large number of the younger artists to arms. How many valuable talents were lost on the battlefields and in air raids was unknown. In all countries painters served as pictorial recorders of military events either for the government or for the armed forces directly or for private organizations, especially for newspapers and magazines. In England an interesting volume was compiled: *War Through Artists' Eyes* (London, 1945) from which the paintings of Richard Eurich, Paul Nash, John Piper and Graham Sutherland may be mentioned. In the United States official war artists and artist correspondents accompanied the navy, the air corps and the army into all four corners of the world. Exhibitions by the artists of *Life* magazine, of the Abbott laboratories on army medicine and other enterprises showed, in general, a high level of truthful observation and of skilful rendering. The former type of battle scenes and national glorification pictures yielded to an interpretation of small instances in which the fear,

agony and destruction suffered by the individual were recorded. The pictures by Millard Sheets, Joseph Hirsch, David Fredenthal and Richard Breinin may be mentioned as moving and effective documents.

In a few powerful works artists, beyond the task of recording, contributed to an interpretation of the spirit of the great cataclysm. They created symbolic images, in which the horror and despair of mankind was expressed by forms betraying the inner conflict of the period. Like a premonition of the events to come, the Mexican David Alvaros Siqueiros painted in 1935-36 the panel entitled "Collective Suicide," in which the pending catastrophe appears in the form of a visionary holocaust. The same artist created a picture of haunting intensity entitled "Echo of a Scream," a free translation from a cover of *Life* magazine, in which, by means of exaggerated plasticity, a surrealist effect of the mental and physical agony of a child (crying for all children in the world) was achieved. In 1937 Pablo Picasso, the Spaniard who had lived from 1901 in Paris, painted "Guernica," a monochrome canvas, 11 ft. high and 25 ft. long. The name of the picture referred to a small Basque town which was totally destroyed by German bombers under Gen. Francisco Franco in a punitive action. In it is seen the disjointed fragments of men, women, children and animals which by the violence of their gestures and the exaggeration of their forms cry out the protest of a violated humanity. The different motifs of this painting had their roots in earlier works of the artist, back to 1925, and one may therefore say that the painter as the most sensitive seismograph of a period had already created signs which pointed towards the essential experiences of an epoch. Not only does this picture speak of aggression and protest; it is in itself by power of its imagination and form aggressive and exhorting.

In the same year another visionary monumental picture was completed, "The Eternal City," on which the Russian-born U.S. painter Peter Blume had worked from 1934. While in Picasso every form is abstracted to its most pungent expression, in Blume a microcosmic universe is created which has the over-precision of a dream. But as in a dream it shows also the gradual fusion of many realities arousing a surreality of experience. The ruins of the Forum, from the caverns of which people are emerging, the jack-in-the-box-head of Mussolini intentionally out of scale with the rest of the picture, the grotto image of the "Man of Sorrows" and fascist soldiers beating up people form as in Picasso's painting an interpretation of the disfigurement and disjointment of a formerly noble and beautiful world. Looking for parallels in the past, one thinks of Matthias Gruenewald in front of Picasso's picture, of Hieronymus Bosch in front of Blume's work.

A truly transformed and evocative work of art which grew from the experiences of the war was the series of sketches which the English sculptor Henry Moore did in the subways of London during the German bombing attacks; these were published under the title *War Shelter Sketch Book*. Pen drawings and water colours, they represent the denotation of a sculptor who had seen people return to the most primitive functions of life and had watched the misery and the promise of existence in the sleeping, crouching and huddled poses of the modern cave dweller. In Picasso and Moore is noticed that return to the primitive and basic in form and spirit which the artist felt aroused to defend in time of crisis. In such works the war was not represented from without but from within; that is, the artist was experiencing as an individual im-

pulses similar to those which, in mankind at large, are responsible for the breakdown, the defense and the rise of ideals.

* * *

THE TWO most challenging artistic problems posed to the artist were those of abstract art and surrealist art. Abstract art went back to about 1910, surrealist art to about 1920. But both of them still held the centre of attention in the period 1937-46.

Abstract art "abstracted" more or less the potentialities of pure form from outer visual images and either related them to the otherwise invisible realm of emotions or created with purely formal configurations. There was no doubt that this advanced position of abstract art had not yet been understood nor accepted by the majority of the people, who instinctively connected painting with the depiction of visible objects. But abstract art was no longer what it was in the beginning. Not only had it advanced its own problems, it had absorbed elements of surrealist art and created a pictorial language of symbolic images. This development was to a large extent because of a single personality who exerted a powerful influence upon his time such as had not occurred in European art from the days of Jean Ingres and his studio. He was Pablo Picasso, who from the beginning of the century had excelled in originality of invention and execution. Picasso's often changing manners became the starting points for innumerable artists and established an international pictorial idiom which became spoken everywhere. He stimulated the growth of nationally modified painting styles, as could be seen in Cuba or in Mexico. After he stopped painting the inhabitants of the fringe of human society in the early blue and rose period (1901-05), he rarely created works which were outwardly pleasing in colour or line or unusual in subject matter. If one discounts the tremendous propaganda of the press and the dealers which must have had some influence, it was perhaps the uncompromising radicalism and its consistent artistic realization which contributed to the leadership of this Spanish-French artist. His explorations of abstract form and colour relations and his interpretation of the human figure and the introduction of enigmatic symbols (broken swords, bulls, classical busts, etc.) immediately become accepted by artists all over the world.

The pictures which Picasso produced during the decade 1937-46 did not represent a new departure but paraphrased the style formed about 1930. With the exception of "Guernica" and its predecessor "Minotauremachie" (1935), they were not visibly concerned with contemporary happenings, but they explored patterns and signs demonstrated on still lifes and female figures primarily. Triangular and lozenge shapes pieced together with deep, unmodulated colours recall the effect of stained glass windows. Sharp angles make the forms recede strongly into space. An irrational total concept is carried out with utmost lucidity. Pieced-together frontal and profile views translate the homogenous human face into a haunting mask utterly distorted and yet, as a mask, strangely complete. The disintegration of the former concepts of reality and the dissolution of their inherent evaluations seems to be playfully demonstrated in Picasso's paintings.

When in 1946 the British resumed cultural exchange with other countries, they invited as the first to exhibit in the Tate gallery in London Pablo Picasso and Henri Matisse. Both were in a way the "old masters" of Europe and

yet so challenging appeared their paintings across the channel that a heated controversy was stirred up in the English art journals and newspapers. Matisse, then a man of 77 years of age, was just as youthful as Picasso in his products. His art, aesthetically in the tradition of a Renoir, combined sense appeal with high artistic intelligence. It was the outgrowth of pleasure and its aim was pleasure. Matisse continued to paint dressed and nude women posed against richly ornamented backgrounds, to paint interiors and still lifes with sweeping abbreviations and in colour combinations which became the delight of the fashion designer. In fact, Matisse's paintings grew from the same ground as French fashion design. They are not explorations of unknown fields of mind and soul but the independent interpretations of the things everyone has seen and known as pleasant. Consequently, his influence upon decorative painting and decoration in general was very great. Raoul Dufy continued along the line of Matisse with enchanting stenographic pattern-landscapes of the French scene which by their staccato rhythm and gay elegant colours convey a feeling of wit and delight.

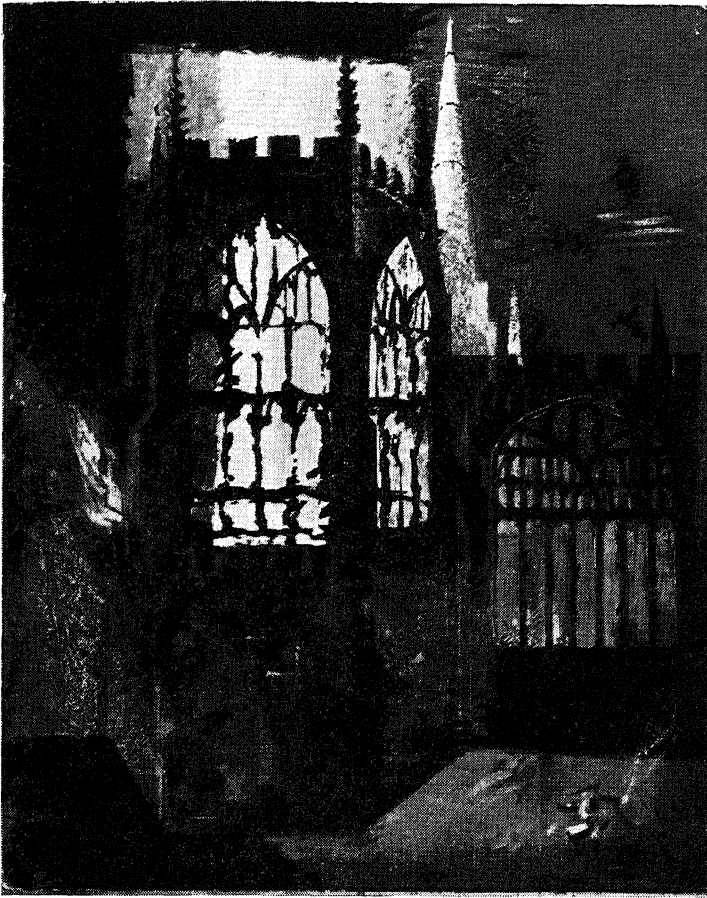
Jean Lurçat, the painter of empty imaginary ruin landscapes, turned toward a more realistic and highly decorative approach. This turn toward the decorative and the pleasing could be observed in several of the older and formerly more rigid artists; it may have been because of the orders received for tapestries and furniture covers which after 1935, under the sponsorship of Mme. Marie Cutoli, brought about a fruitful co-operation between painter and applied arts. The continuity of a great tradition from mediaeval times could be studied well in the exhibition of French tapestries in the Musée d'Art Moderne in Paris in the summer of 1946.

A few of the French painters found a domicile in the United States during World War II. Fernand Léger worked on large wall paintings, some of them executed for U.S. sponsors (Nelson Rockefeller, Wright Ludington, etc.) and in them went a step beyond his former static abstractions. Under the impact of Picasso's art of the early '20s he also began to show a concern with three-dimensional plastic forms fitted together in more flexible designs which recalled the action of pistons and wheels in a starting locomotive.

André Masson pursued a style in which free dynamic line drawing emerged from a rich inner imagery. Thus, a combination of free abstractions, in the manner of the late works of Wassili Kandinsky, and symbolism was created, the influence of which was strongly reflected in some of the younger artists of the United States.

Of the younger French artists who emerged during World War II none had acquired the stature of his predecessors by the end of the decade. It was too early to give a judgment on them. One may mention the work of André Marchand.

In England, more conservative in its paintings than most other countries, abstract and surrealist art showed a rejuvenating effect. Even though most of the country's artists were dedicated to representation of actual scenes, abstract art had been helpful in organizing design, emphasizing the essentials and admitting the imaginative. With its support Paul Nash developed his primarily lyrical landscape painting, while John Piper created architectural scenes of an extraordinarily intense mood. Graham Sutherland increasingly yielded to the fascination of Picasso's pictures and after depicting the devastations of wartime England created tormented symbols of struggle and pain in his thorn tree pictures. All of these artists challenged the tendency of English painting to render only the pleasing

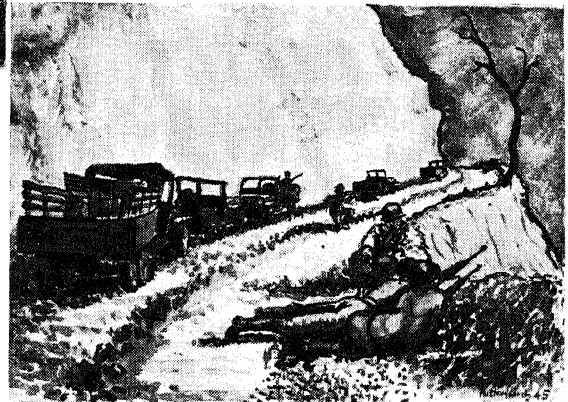


Above: "Coventry Cathedral, November 15th, 1940" by John Piper, who was officially commissioned by the British government to record the destruction of the city by German bombs



Above: Sgt. Howard Brodie's model for this drawing was one of the riflemen engaged in a frontal attack against German positions near the Roer river in 1945

Right: "Snipers," a 1945 water colour by T/5 William de Jarnette Rutherford, U.S. army combat artist, recording action on Luzon Island in the Philippines



Below: Cossacks charging nazi invaders, as sketched by the Russian artist Adriana Yermolaeva, and reprinted in *Your Defenders*, a collection of soviet war art



and sociable aspects of human life. No less lyrical than the English pre-Raphaelites, they deepened their emotions by delving into the depths of human existence. In spite of the influx of enhanced vitality, their paintings are more delicate in colour and more fragile in design than those of painters of other nations. A place of its own belongs to the water colours of the sculptor Henry Moore, among the most original creations of the period. With the eye of the sculptor he reduced human forms to rudimentary moulds and casts which live their silent, prenatal existence in the space of an aboriginal nature. A modern mythology is re-connected with the spirit of the columns of Stonehenge.

In the Netherlands abstract art found an uncompromising representative in Piet Mondrian, who died as a political refugee in New York in 1944. His rectilinear compositions of well-spaced black lines, interspersed by coloured cubes somewhat comparable to a musical score in line and colour, not only found successors in the United States such as Rice Pereira, but had a strong effect on typography and other fields of design. This was understandable because an art exclusively based on proportion and relation of forms free of reference to nature or to the mind is by its very character a decorative art.

In the United States abstract art arrived 20 years later and therefore was reaching its full impact at the decade's end. It had half-expressionistic, half-abstract pioneers in John Marin and Lyonel Feininger. Both formed their styles under the influence of German expressionism and French Fauvism. Both showed a consistent maturing of their work which, in spite of its semiabstract nature, is based on an intimate observation of nature.

From the younger generation a few stood out by the same consistency and technical ability: Charles Howard, Stuart Davis and Karl Knaths built their paintings in the spirit of architectural structures while William Baziot, Robert Motherwell, Hans Hoffmann and Ashile Gorky produced in the spirit of freely-flowing musical associations with an emphasis on rich colour textures.

In Latin America Carlos Merida translated the mythical world of pre-Columbian civilizations into hieroglyphic abstract compositions. The Chilean Matta Echaurren, also influenced by Picasso, was concerned with phosphorescent colour—spaces out of which never-before-seen emanations burst forth. In Cuba quite a number of followers of Picasso blended the tropical colour scheme with semi-abstract designs imported from Paris on a high level of artistic refinement. Amelia Pelaes, Wilfredo Lam and Ponce de Leon may be mentioned.

* * *

EXPRESSIONISM developed at the same time as abstract art in France and Germany. But while abstract art harked back to the late paintings of Paul Cézanne, expressionism grew on the field prepared by Vincent van Gogh and Eugène Gauguin. This primarily northern style lost one of its originators and greatest representatives with the death of the Norwegian Edvard Munch in 1944. With its emphasis on emotional strengthening of colour and expressive distortion of forms, such as Matthias Gruenewald and El Greco had shown centuries earlier, it had found a strong incentive in the challenging atmosphere of war and revolutions from 1914.

In France George Rouault alone developed the expressionist elements of the Fauve period of Matisse and Picasso (1905–06) to a brilliant although monotonous climax. His clowns and men of sorrow, his harlots and oriental prin-

cesses transcend their destiny expressed in the harsh stamp of their immobile masks by the grace of precious colours of the quality of molten glass pastes. Rouault was termed a religious painter and his art was likened to that of the stained glass windows of mediaeval cathedrals. His art was enthusiastically greeted in England and the United States by private collectors and museums.

The impact of the serious work of some of the leading expressionist exiles of Germany, living during World War II in the Netherlands and England, was felt in the U.S. Oscar Kokoschka did not paint much during his stay in London, but many of his former paintings sold by the Nazi government from the walls of German museums found a new place in U.S. collections and contributed to the growing respect for this inspired painter. The same was true of Max Beckmann, several of whose large triptychs were immediately absorbed by U.S. museums and private collectors. Both were emphatic colourists and dramatic interpreters of their time.

Mexico gave the world a number of expressionist painters of rank in whom, as in Europe, the ideology of their own world deeply fused with the form expressive of it. It is unnecessary here to write about Rivera and Orozco, who pursued the line of their revolutionary and national ideals in murals and paintings. Orozco's "Divebomber and Tank" combines the rhythm of Aztec decoration with the organization of abstract painting into an expressive symbol. David Siqueiros' art dealt prevalently with social problems in somber and monumental compositions. Rufino Tamayo, who worked in the United States, became perhaps the foremost expressionist painter of his nation. In colour and design the very spirit of Mexican pre-Columbian art seemed reborn. The fresco in the art library at Smith College showed him eager to emulate his Mexican predecessors. But his true gift seemed to be in the direction of painting without any ideological tendency, in the display of his brilliant colour sense and his inventive compositions.

Another Latin-American expressionist of brilliant gifts was the Brazilian Candido Portinari, whose frescoes in the Library of Congress in Washington, D.C., are among the most impressive executed in the United States. His fanciful interpretations of Brazilian mulatto life have less weight and conviction than Mexican painting in general, but enchant by their witty and skilful realization.

In the United States Jack Levine showed a forceful expressionism dedicated, like that of George Grosz, to aggressive commentaries on contemporary society. Ivan le Lorraine Albright was an expressionistic realist or a realist expressionist, looking at the world with a magnifying glass and enjoying the horrors of his distorted vision. Elements of magic, realism and expressionism were fused in Ben Shahn's paintings, which proved a keen sense for original composition applied to sharp focused interpretations of city life. The unifying element in most expressionists was that they were actively concerned with humanity, that out of this concern there was often an aggressive or revolutionary attitude in their art expressed by a declamatory richness of texture and form. Exceptions to this were Mark Tobey and Morris Graves, who gave the visionary's response to the outside world in exquisite creations which independently continued what Paul Klee first had created in western art: emotional diagrams in which dreams and play flow together after the manner of a world-wise child.

* * *

A LATER ARRIVAL on the European scene, developed around 1920–25, was surrealism. Its main representative, Salvadoré Dali, went in 1938 to the United States, followed

by Max Ernst, Yves Tanguy and others, and thus helped to spread the style of surrealism over another continent. It was based on the same contradiction as that experienced in dreams: the creation of incoherent and translogical images rendered with minute precision of details which lend by their exactitude conviction and emotion to otherwise inconceivable appearances. The medium for such precision in the service of the fantastic or unusual was the revival of a painstaking, even microscopic, draughtsmanship, an "old masterly" approach to a contemporary problem. The ikonography of the surrealists was derived, to some extent, from sex symbolism but was related to fears and fascinations which had their roots in the experience of time and space. In other instances the fantasies of surrealist painting were of a merely literary nature, a modern form of 19th century entertainment art. As such, it had considerable influence on modern advertisement and window decoration.

A side branch of surrealism was neoromanticism. The same emphasis on "old masterly" techniques and skills was put in the service of painted romances. Instead of the surrealist "defaitism" we see ruins and people of a beautiful past conjured upon a fantastic scene. This approach had its origin in France, but again because of political events some of its best representatives emigrated to the United States: the Italians Rico Lebrun and Corrado Cagli, the Russian-French Eugène Berman. The latter was especially creative as a stage designer.

In addition to the exponents of the newer trends in art there were still a number of excellent impressionists and naturalists active during the decade in different parts of the world: Prince Eugene of Sweden; Pierre Bonnard, Dunoyer de Segonzac in France; Muirhead Bone in England; Charles Burchfield, Alexander Brooks, John Carroll, Peter Hurd, Eugene Speicher, Boardman Robinson, Maurice Sterne, Henry V. Poor in the United States. While their work did not reflect the ten years primarily, it very well mirrored the broader aspects of the contemporary age.

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Looking for a common denominator in painting of the decade, the critic would have to mention the increasing influence of abstract art. This withdrawal from the task of representing and interpreting visual impressions was the deepest break with a 2,000-year tradition of western art. It apparently had its reasons, partially in the ever-increasing awareness of the motivations and the resulting motives, symbols and designs which led to similar self-consciousness and dissolution of formerly naively accepted realities in psychology and literature. It may also have had a relation to the dissolution of the concept of reality in modern physics. Where every constant in time and space is but a relation, dependent on the point of view from which judged, art itself may easily turn to the exploration of relations of a primarily formal nature. The instability and revolutionary atmosphere of the decade also found expression in the experimental character of its art. While subject matter, a common point of reference between onlooker and artist, disappeared in abstract art, it took on a new importance and transcended reality in surrealism. (See also SCULPTURE.)

(A. NR.)

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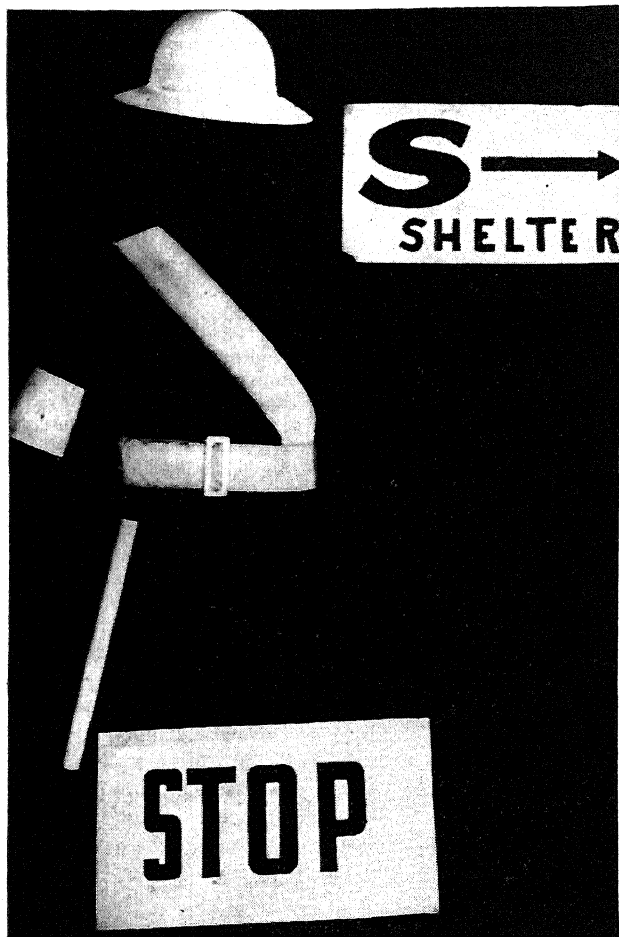
Paints and Varnishes

Production of protective and decorative coatings practically doubled during the decade 1937-46. The technical program kept the paint industry apace with modern developments of other industries. Finishes and finishing methods underwent continuous evolution in line with the needs of the consumer, and with the new and improved raw materials which became available to the coating manufacturer. The wartime emergency brought forth many new products and re-examination and utilization of older materials that otherwise might have become obsolete at an earlier date.

Because of the military need, many special fields were studied. In the case of anti-fouling paint for marine use, a hot plastic composition was developed which gave much greater protection against marine growth and thus increased the efficiency of naval ships. The necessity for frequent dry-docking was greatly reduced, permitting longer cruising periods. Flame-retardant compositions for tarpaulins and tenting were other important wartime developments with real value for civilian use in peacetime. Circus tents presented much less fire hazard as a result of this work. The efficiency of the coating was largely dependent on its chlorinated paraffin and antimony oxide content.

Metal treatment and metal protective paints received a great deal of attention and were considerably improved through these studies. The importance of proper metal preparation had been illustrated many times, and chemical treatment of metal as well as mechanical cleaning became well established during the decade. Chemically-prepared coatings such as phosphates and chromates proved themselves on metals such as galvanized iron, steel, magnesium and aluminum in improving both adhesion and corrosion resistance of the painted surface.

A thick protective "strip coat" was developed for use on mechanical parts such as gears to eliminate corrosion and mechanical injury during shipment. This composition was unique in that it could be applied hot by dipping; it quickly solidified to a moisture-resistant coating. The material exhibited little adhesion to the part being coated and could be peeled off easily just prior to assembly. Not only was the coating of great value for shipment of spare parts to military bases, but in some cases it proved valuable for inter-factory shipments of highly machined parts. The desirable properties, rust protection and low adhesion, were secured by using mineral oil and ethyl cellulose in



Luminous paint filled many needs in blackouts during World War II. This "blacked out" scene shows an air raid warden's luminous helmet, belt, arm band, stick and warning signs, all visible for approximately 150 ft. in the blackout

the composition.

Camouflage.—Camouflage and blackout paints were of real value during the war. They were prepared from non-critical available materials whenever possible, notably wool grease in Britain and asphalt and other emulsions in the United States.

The necessity of having proper photographic value, particularly in the near infra-red, received a great deal of attention. Since infra-red photography was widely used by observation planes because of its better haze penetration as well as camouflage detection, it was necessary to have all military camouflage exhibit the same infra-red reflectance or brightness as the surrounding natural terrain. The coloration should also be the same, to confuse visual observation. This was particularly a problem in the necessary range of green colours, since most trees and grasses photograph a very light gray in the infra-red, and the common chrome green paint pigments photograph black by infra-red methods. Desirable green colours matching in both the visual and infra-red regions were produced by combination of special green pigments such as chromium oxide and antimony sulphide black.

Paint in Industry.—In the field of industrial application of finishes, the use of electrostatic spray and electrostatic "detearing" methods stood out. Through the use of a high potential electrostatic field, an article being sprayed conserved a great deal of material, but more uniform coats could be applied in a shorter time. This method was more efficient on small irregularly shaped articles than on items

with large plane surfaces such as household refrigerators, etc. Electrostatic "detearing" was especially valuable in dip-painting of certain articles, for example, toys or chair seats where the removal of a soft bead or heavy ridge of paint which may stay soft or gummy is desirable.

Infra-red baking as a means of commercial finishing of painted products gained wide acceptance during the decade. Originally started as an automotive production method, the method had considerable popularity before World War II. Increased production speeds urgently needed for the war emergency gave real impetus to infra-red baking methods; one of the main advantages of this process was the relatively low cost of equipment installation as compared to the convection type oven. Infra-red baking by no means displaced the more conventional baking methods, but it augmented and supplemented them greatly. The method became particularly useful where rapid heat-converting resin compositions could be used and where it was possible to design the oven to give fairly uniform heating of the metal or other surface being coated; for example, a stamping or other article where the metal was of fairly uniform thickness. In certain instances the tendency to produce uneven heat was of little consequence, as in the case of automotive primers.

Composition.—The composition of coatings was, of course, under continuous study by the industry. Improvement and advances in synthetic resins was the byword of the decade. Alkyd resins became predominant; most popular alkyds were made from phthalic anhydride chemically reacted with glycerine or other polyhydric alcohol and modified with various proportions and types of vegetable oils. For example, when linseed oil was used, the resin dried in air without heat, whereas if coconut oil was used, the resin was usually cured or dried by baking. They were available in an almost unlimited number of variations designed for specific uses. Special alkyds were designed for metal protective paints where the material had to be applied by brushing, as to bridges. Here the resin content from the phthalic anhydride and alcohol would be low (possibly 12%) in order to have easy brushing properties; linseed oil would probably be used to have an air-drying finish.

In the case of spraying materials, such as automotive finishes, the resin content might well be considerably higher—in the range of 40–50%—to secure greater durability, hardness and speed of drying.

Special resins were widely used for high temperature baking whites, such as those used on refrigerators; they practically displaced nitrocellulose lacquers for this work. Because of their versatility, good performance and reasonable cost, there was hardly a major finishing field not affected by the utilization of alkyd resins.

One of the newcomers that proved very popular and useful was the urea-formaldehyde type of resin, including melamine resin. These materials could convert or harden quickly with heat and thus were important in infra-red baking; they became widely used with special alkyd resins for appliance whites and other hard, tough baking materials.

Hydrocarbon resins synthesized from petroleum and turpentine made a place for themselves and continued to gain popularity. In the field of high chemical resistance, phenolic resins, chlorinated rubbers and vinyl materials continued to be predominant.

Silicone resins were another development of the decade; they combined excellent resistance to high temperatures found in domestic stoves with extremely good resistance to household food and cleanser materials. The silicone resins

were produced in a variety of consistencies for various types of application; their relatively high cost was their principal drawback.

Although drying oils continued to constitute a major portion of commercial coatings, the shortages of tung, perilla and other imported drying oils promoted major developments and improvements in domestic oils such as linseed, soybean and fish by removing much of their non-drying components, either by using a solvent to extract them or by fractional distillation of their fatty acids. These oils could also be improved by isomerization so that their drying character and resistance of their drying films more nearly approached those of tung oil. The availability of large amounts of raw castor oil from Brazil permitted large commercial exploitation of a process of dehydrochlorination whereby the completely non-drying character of raw castor oil was changed to superior drying characteristics between those of linseed and tung oils.

Home Paints.—While industrial finishes underwent continued improvement, trade sales materials for the painter and home owner also were improved through use of the new materials, particularly the alkyd resin finishes. These products, in general, exhibited greater durability, better gloss retention under exterior exposure, easier washability and better colour retention for interior finishes.

The decade saw the introduction of resin emulsion paints, which gained great popularity. The fact that these materials were easy to use on a great many surfaces contributed greatly to their acceptance, and their substantial lack of solvent odour and fire hazard plus easy washability of brushes used with them made them exceptionally popular with the home owner.

The British Industry.—Great Britain's paint industry during the decade had an unusual problem of raw material supply, for it, unlike the United States, imported a major portion of paint materials. Homemade substitutes were sought particularly for the bulky, low-cost materials such as carbon black, iron oxides, barytes, talc, asbestos and diatomaceous earth among the pigments. Petroleum spirits were replaced in many cases by solvents derived from home-produced coal tar.

Proximity to military operations and the constant probability of air raids with consequent damage to industrial as well as military establishments demanded wide and quick interchangeability of paint supplies. Performance specifications for coatings were inadequate to insure complete interchangeability, so manufacturers, formerly with competitive formulas, co-operated with governmental agencies to produce military coatings on standard formulas.

Lanolin, as a by-product of the British wool industry, was used in camouflage and other emergency paints of low-drying requirements. Fluorescent paints were reasonably successful in signs and markers for guidance during blackouts. Temporary identification markings for aircraft and other purposes were permanently soluble in gasoline for easy removal.

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Palaontology

Invertebrate Palaontology.—Judging by number of publications, invertebrate palaontology was steadily expanding in volume and scope until the outbreak of World War II. In 1939, more papers were published and probably more persons were engaged in palaontological studies than ever before. From 1937 through 1939 about five-sixths of the publications recorded studies in eight countries which, in order of importance of their contributions, were: United States, the U.S.S.R., Germany, Great Britain, France, Australia, Italy and Japan. The remainder was produced in 25 or more other nations. The relative position was similar to that prevailing in previous periods except for the greatly increased importance of soviet palaontology.

The United States led the world in research published from 1937 to 1946. It exceeded every other nation in importance of its work in most of the broader fields of palaontology and was particularly outstanding in the study of Tertiary and pre-Carboniferous faunas and in micro-palaontology. Soviet research equalled or excelled U.S. research in the Carboniferous and Permian, and both France and Germany exceeded the United States in Mesozoic studies. Although the rate of U.S. publication fell off after 1939, the decline was slight compared to the other principal nations, but research lagged behind publication.

The great strides made by the soviets in science were nowhere more obvious than in invertebrate palaontology. Almost all soviet palaontologists belonged to a post-revolutionary scientific generation; they had advanced rapidly from an insignificant to a commanding position. After the German invasion, soviet publication declined greatly and steadily but not as rapidly as might have been expected. Continued government support of palaontology indicated a far-sighted policy, probably equalled in no other country, recognizing the indispensable aid of this science in solving problems encountered in the rapid expansion of mineral industry.

Germany and France had long held important positions in invertebrate palaontology which were maintained until the outbreak of war. Thereafter their publications declined rapidly in number and importance and by 1943 practically ceased.

English and Australian publications declined after 1940 to about one-half of their prewar volume but continued to appear fairly steadily at the latter level.

Japanese publication increased steadily in the later pre-war years. The number of Italian publications was somewhat smaller but, in general, of greater importance. Both nations practically ceased publishing after they entered the war.

A very serious loss to palaontology, not yet fully assessed, was incurred by the destruction of museums in western Europe. These housed many famous and important collections, some of which were scattered, damaged or lost.

Most research in invertebrate palaontology conducted between 1937 and 1946 was systematic, and most publications were descriptive. Some studies were biopalaontological, but few of the world's great faunas were adequately known and much more basic data had to be collected before such studies were likely to achieve wide significance.

Finer discriminations were made between species and

genera, and the tendency increased to raise various groupings in taxonomic rank. Old species were raised to genera and subdivided, and old genera became subfamilies or families composed of numerous new genera. New groups were based on differences not always clear-cut or easily observed, and identification became increasingly difficult so that many groups now required the attention of specialists.

Classification of several important groups, in categories above genera or families, was broken down by new discoveries. Generally accepted classification did not exist or was recognized to be more or less unsatisfactory for most of the invertebrate phyla. Newly proposed classifications were built on supposedly phylogenetic lines and mostly ignored the consideration of practical usefulness. Basic data were too few at the end of the decade, however, to indicate most phylogenetic lines with desirable clarity.

Invertebrate palaeontology during the decade apparently was in an advanced stage of its descriptive development, but interest in biometric, ecological, bionomic and biogenetic fields was evident and increasing. (See also *GEOL. OGY.*) (J. M. Wr.)

Vertebrates.—A revised edition of A. S. Romer's *Vertebrate Paleontology* in 1945 provided a readable, profusely illustrated account of the evolution of the vertebrates. G. G. Simpson's *Tempo and Mode in Evolution* achieved a stimulating synthesis of palaeontology and genetics; it was particularly valuable for the attention it focused on the probability that short periods of rapid and profound evolution in comparatively small populations led to the emergence of the vertebrate classes. This work took its place with other syntheses (Theodosius Dobzhansky, Ernest Mayr, J. S. Huxley) that reflected an active trend toward integration of various sciences in the endeavour to obtain a better understanding of evolutionary processes. The second part of Hans Böker's *Comparative Biological Anatomy* appeared during the decade. Böker's method should exert considerable influence on vertebrate palaeontology, his theoretical outlook not affecting the usefulness of his approach. In the field of methodology, Simpson and Anne Roe's *Quantitative Zoology*, illustrating the application of statistical techniques to zoological and palaeontological problems, and a series of studies by J. A. Kälin on basic comparative anatomical methodology may be cited.

The view that the earliest fishes were provided with an extensive dermal armour, rather generally accepted, regarded the lampreys, hag fishes and even *Amphioxus*, as degenerate descendants of once-armoured ancestors. E. I. White's account of *Jaymoyti*, an unarmoured, primitive member of the Agnatha from the late Silurian, suggested the possibility that not all forms went through a bony stage. The classification of all fishes remained in a state of flux. Contributions to knowledge of the jawless fishes, class Agnatha, were made by E. H. O. A. Stensiö and Anatol Heinz. G. M. Robertson and T. S. Westoll did not regard the lateral fields in the Osteostraci as electric organs. D. M. S. Watson greatly clarified the conception of the primitive jawed fishes (Placodermi) by his thorough account of the acanthodians. Other contributors included Stensiö, Heinz, Tage Nilsson, D. H. Dunkle and J. A. Moy-Thomas. The relations of the Placodermi to the Agnatha on the one hand and to both the classes Chondrichthyes (sharks and allies) and Osteichthyes (bony fishes) on the other were as yet quite uncertain. Stensiö and

Westoll sharply contrasted the Placodermi with other primitive fish groups and, among the placoderms the acanthodians with the Arthrodira, Antiarchi, etc. The same authors discussed the origin of paired fins, modifying some views of W. K. Gregory and H. C. Raven and Walter Gross. Moy-Thomas showed that the two main lines of development within the shark class are the Selachii and the extinct Bradyodonti, Holocephali being a probable offshoot of the latter. Much was done on the ray-finned fishes (Actinopterygii) by James Brough, Hermann Aldinger, Moy-Thomas, Westoll, D. A. Rayner, R. T. Wade, A. S. Woodward, Eigel Nielsen and others. The old, orderly succession of the subclass from chondrosteans to holosteans to teleosteans was broken down. The Holostei, and Brough's "Sub-Holostei," now appeared to be unnatural groupings composed of independent offshoots from palaeoniscoid complex. Romer, Westoll, C. Forster-Cooper, Stensiö, Gunner Säve-Söderbergh, Moy-Thomas, Bobb Schaeffer, Erik Jarvik and others contributed to the knowledge of the fishes of the group Choantichthyes and of their relations to the Tetrapoda. The ancestry of the Amphibia appeared to be in the crossopterygian family Osteolepidae, and the separate origin of the salamanders from the lungfish group (Nils Holmgren, Säve-Söderbergh) was discounted.

During the decade, it was possible here and there to fill the apparent gaps between the quite distinct groups of amphibians and reptiles, and thus suggest closer relationship between them. This came about partially with the discovery of new faunas in new territories, e.g., a Permian fauna in the U.S.S.R., that seemed to be intermediate between the Clear Fork of Texas and the *Tapinocephalus* zone of South Africa. This fauna included mammal-like *Deinocephalia*, which filled the structural gap between the pelycosaurs and the sphenacodonts of Texas and the titanosaurs and the tapinocephaloids of South Africa.

But it was not merely the discovery of hitherto unknown faunas that greatly widened the knowledge of fossil amphibians and reptiles; of equal importance were numerous efforts to further knowledge of previously discovered faunal assemblages, to subject individual groups to monographic review and to deepen the foundation upon which phylogenetic relationships could be suggested by comparative morphological studies. Foremost among the monographs on individual groups were the review of the *Pelycosauria* (Romer and L. I. Price), R. S. Lull and Nelda Wright's unarmoured, *Hadrosaurian Dinosaurs of North America* and C. W. Gilmore's *Fossil Snakes of North America*.

For the interested nonspecialist a noteworthy, semi-popular "vertebrate palaeobiology" was prepared by E. H. Colbert, written around the attractive topic dinosaurs, hence its name *The Dinosaur Book*. It gives interesting back-stage information on general palaeontological study-methods and pictures the dinosaurs against the impressive background of the history of vertebrate evolution. S. P. Welles reviewed the long-necked plesiosaurs of North America and reviewed the order as a whole. A comparative study by C. L. Camp on the osteology of the *Mosasauroidea*, based on California forms, included much needed information on cranial anatomy, especially of the brain-case.

Significant faunal studies of the Permo-Triassic period include Friedrich von Huene's of the fauna of the southern Gondwanaland, that of the Permo-Triassic beds of the U.S.S.R. (J. A. Efremov), of Madagascar (Jean Piveteau) and of East Greenland (Säve-Söderbergh). Although 20

years of extensive excavation had passed, Bernhard Peyer's *Fauna der Tessiner Kalkalpen* appeared far from completion. These and other studies brought forth a great many interesting forms, among them a Permian frog from Madagascar (Piveteau, Watson), *Dvinosaurus*, a neotenic stegocephalian (A. P. Bystrow) and several Labyrinthodonts from Spitzbergen, Greenland and the U.S.S.R. (Säve-Söderbergh, Efremov, Bystrow). Among reptiles should be mentioned *Venjukovia*, a forerunner of the dicynodonts (Efremov), *Deinocephalia* and *Pareiasaurs* (A. P. Hartmann-Weinberg), *Kotlassia*, a seymourid (Bystrow), *Stahleckeria*, a Triassic Brazilian dicynodont (Romer and Price) and *Paranothosaurus*, the first nearly complete, articulated specimen of a large *Nothosaurus*-like sauropterygian (Peyer). Interesting new turtles included a pleurodiran (*Podocnemis*) and two thalassemyids from the late Cretaceous of Arkansas, (K. P. Schmidt), a Miocene *Macrochelys* (Rainer Zangerl) and others (F. M. Bergounioux, C. W. Gilmore). A few additions were made to the growing list of Tertiary and late Cretaceous Crocodilia (C. C. Mook, Kälin and others). Redescriptions of previously poorly known forms based on additional materials were equally as significant as new discoveries; only a few can be mentioned. H. G. Sawin studied the braincase of *Eryops*. Colbert described new materials of the genus *Hypognathus*, a procolophonid from the Triassic of New Jersey; the protorosaurian genera *Prolacerta* from the early Triassic of South Africa (Camp), *Macrocnemus*, a short-necked form close to *Tanystropheus* from the marine middle Triassic of Switzerland (Peyer) and *Trilophosaurus* from the late Triassic of Texas (J. T. Gregory) were subject to thorough redescription. L. D. Boonstra's work expanded knowledge of the *Deinocephalia* and *Bauriamorpha*, and White's of the osteology of *Seymouria*; E. C. Olson worked on the comparative cranial morphology of the therapsids and mammals, F. R. Parrington studied the tooth replacement in theriodonts, Nilsson wrote on the anatomy of the lower jaw in primitive amphibia from Spitzbergen, Schaeffer studied the structure of the tetrapod foot and Gregory suggested *Pareiosauria* as possible ancestors of the turtles.

Birds remained the least well represented vertebrate type in the palaeontologic record. No outstanding discoveries were made during the decade. Samuel Schaub recorded a probable ostrich relative in the Eocene of Europe. Alexander Wetmore, L. H. Miller, Hildegard Howard and H. I. Fisher described North American Cenozoic birds, and Angel Cabrera, Lucas Kraglievich and Bryan Patterson published work on the South American phororhacoids. Carl Wiman and Tilly Edinger discussed the Madagascan *Aepyornithes*.

In Simpson's *The Principles of Classification and a Classification of Mammals*, the classification was carried to genera, and succinct resums were given of each order and higher group. Mammalian history now dated essentially from the Jurassic, removal of the *Tritylodontoidea* to the *Reptilia* (C. C. Young, Oskar Kuhn, Watson) leaving only a few dubious mammals of uncertain affinity to represent the class in the Triassic. W. D. Matthew's monograph on the earliest Palaeocene faunas established two basic divisions of the placentals—the carnivore-ungulate group and the insectivore—bat-primate-edentate group. Recognition of the fact that animals so different as the modern carnivores and hoofed mammals are descended from a common stock constituted one of the major triumphs of palaeomammalogy. Simpson formalized these two divisions as the cohorts *Ferungulata* and *Unguiculata* and added two more—*Glires* (rodents and rabbits) and

Mutica (whales).

These four grand divisions remained distinct as far back as they could be traced.

Much was written and discovered bearing on the ancestry of man and his near relatives. Although perhaps a majority of students, (e.g., Gregory), inclined to the belief that man and the great apes evolved from the mid-Tertiary dryopithecine group, authority could be cited (e.g., Robert Broom) for a belief that the human line was independent of the anthropoid for a much longer period of time. Much was added to knowledge of the African australopithecines by Broom's discoveries in South Africa. These forms were more apelike than manlike in skull structure but more manlike than apelike in the dentition and in the few known scraps of the skeleton. It was uncertain whether these forms were Pliocene or Pleistocene in age. If Pleistocene, they were very evidently not on the direct human ancestral line.

New discoveries of *Pithecanthropus* in Java by G. H. R. von Koenigswald, studied by Franz Weidenreich, emphasized the practical identity of this form and Peking man (*Sinanthropus*). Truly gigantic hominids were described by Weidenreich from the Pleistocene of southeastern Asia. Additional information on Neanderthal man was made available, particularly by Sir Arthur Keith and T. D. McCown. Discovery of scanty remains indistinguishable from those of modern man in deposits of penultimate or Great Interglacial age at Swanscombe, England, suggested that the species went back at least as far as mid-Pleistocene. Chronology and correlations of Pleistocene deposits received considerable attention (Friedrich Zeuner, H. L. Movius, Jr.).

As regards palaeogeography, the evidence afforded by the Mammalia appeared to favour the view that during the Cenozoic era the relations of the continents were essentially the same as in the contemporary period. South America was isolated from early to late Tertiary, and North America and Eurasia were periodically united by a land connection at Bering strait. The evidence from earlier eras was much less complete. Close similarity of North American and European Palaeozoic faunal assemblages lent some support to the hypothesis of continental drift (Westoll, Romer), but this was not yet conclusive. The discovery of *Bothriolepis*, a Devonian fish, in China (C. C. Young) and the occurrence of Permian reptiles similar to those of South Africa there and elsewhere in the far east, suggested the possibility that the faunal assemblages in question may have been world-wide in distribution, thus requiring no great geographical changes to account for their distribution.

Advances in vertebrate palaeontology during the decade were numerous and far reaching. It was encouraging to reflect that these advances had taken place despite the fact that during more than half of the period under review the world was suffering from the most destructive war in history.

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(B. Pn.; R. ZL.)

Palaeobotany.—The following areas of palaeobotanical investigation received particular attention during the decade 1937-46:

Microfossils as Indices in Stratigraphy.—Many kinds of spores and pollen grains reflecting the vegetation of the period occur as isolated bodies in shales, clay, peat and coal. Appropriate masceration methods free these microfossils for investigation. Thus pollen spectra or the statistical analysis of the microfossils of various coal deposits, for instance, may be used as an aid in the identification and correlation of coal seams of both the Palaeozoic and Mesozoic and apparently to later deposits of various kinds. The evidence indicated that many, if not all, coal seams possess a recognizable difference in microfossil content by means of which specific deposits might be recognized. Many microfossils were described, figured and classified into genera and species, but their proper assignment to the specific plants which bore them was not generally possible at the end of the decade, particularly when dealing with older horizons. In studies of later deposits (Tertiary and after) in addition to other types of plant remains, microfossils were generally used as an aid in interpreting problems of distribution, succession and ecology of fossil plants and their relationships to modern floras.

Studies emphasized potential difficulties of interpretation based on pollen analysis such as misidentification of critical specimens, distortion of size or structure due to masceration methods, preservation differences of various spores, inadequate sampling methods, etc. The recognition of these and additional problems and the development of techniques for their solution represented significant advances.

Palaeoecological Method.—The study of past floras based on ecological concepts and methods (palaeoecology) presented new possibilities in the interpretation of the occurrence, composition and migration of fossil floras and the closely related problems of climate and topography. The palaeoecological method continued to depend upon an accurate knowledge of modern plants which might then prevent incorrect inclusion within fossil floras of species incompatible with the other members of the group from the point of view of climate or distribution. In correcting the single greatest source of error—the misidentification of fossil plants—it was found to be necessary not only to become familiar with similar plants in the modern flora, but also to identify diagnostic differences between plant parts which were in general quite similar.

Relative abundance of species in a fossil flora increases the significance of the list, but numerical dominance alone may give a false picture, as it is influenced by such aspects as the size and shape of the leaf, its ability to withstand destruction, the deciduous nature of the plant and its distance from the place of deposit. It was found that the nature and general conditions under which a fossil flora lived could best be estimated by a study of conditions in which an ecological equivalent flora exists. Estimates as to temperature, precipitation and topography based on this approach appear to have been more soundly proposed.

Palaeobotanical Techniques.—Techniques in the preparation of plant fossils for most efficient study received considerable attention. Refinements of J. Walton's nitrocellulose "peel" method and critical comparisons of these peels with thin ground sections of the same petrification indicated the value of the nitrocellulose peel in securing close serial sections and was in general satisfactory if checked against an occasional thin rock section. Added experience in the masceration of coal and peat and in the use of various synthetic resins as mounting media for

spores, peels and thin sections was gained. Brief experience in the use of dyes in the differentiation of tissues of petrified plants indicated the need for further investigation of its possibilities, as did the use of infra-red photography in the elucidation of structure of opaque compressions. A most useful technique was the substitution of the wire-cutting technique for sectioning small petrifications or when the critical area of a petrification might be destroyed by the kerf of the usual lapidary diamond or carborundum saw.

Fossil Algae.—Although the preservation of fossil algae from the pre-Cambrian and older Palaeozoic was often such that definite determinations had been difficult, the general effect of researches was to strengthen the certainty of the algal nature of many of the described forms. Carroll Lane Fenton in 1946 placed the older algae into five families with the probable earliest occurrence: Cyanophyceae, pre-Cambrian; Chlorophyceae, lower Cambrian; Phaeophyceae, Ordovician; Nematophyceae, Silurian; Rhodophyceae, Ordovician, or if the stromatolites or spongiostromes are accepted as algae, then back to the Archean.

The Charophyta, represented in fossil form by the characteristic oogonia and occasionally by antheridia and fragments of the plant body, were classified by Raymond E. Peck in 1946 into four families: Syncidiaceae, Devonian and Mississippian; Trochiliscaceae, Devonian and Mississippian; Clavatoraceae, Upper Jurassic and Lower Cretaceous; Characeae, Pennsylvanian and after. The value of fossil algae as ecologic indicators was presented with the suggestion that they might well be considered an additional aid in palaeoecology.

Fossil Bryophytes.—The record of fossil Bryophytes in the older periods remained scanty. Tom M. Harris (1939) in describing from structure a new liverwort, *Naiadita lanceolata*, from the British Rhaetic as possibly allied to the modern *Riella*, listed but four species of hepatics from the Palaeozoic and four from the Mesozoic in which the structure of both thallus and rhizoid was known. The record for mosses during the Palaeozoic is even less extensive. William C. Steere (1946) in summarizing North American Bryophyta of the Mesozoic and Cenozoic listed the following genera with their geologic range: *Hepatites*, Triassic, Jurassic; *Metzgeriites*, Jurassic; *Marchantites*, Lower Cretaceous, Eocene; *Sphagnum*, Upper Cretaceous; *Muscites*, Upper Cretaceous, Miocene; *Jungermannites*, Upper Cretaceous-Miocene; *Palaeohypnum*, Eocene, Miocene; *Plagiopodopsis*, Miocene; *Polytrichites*, Miocene. This list indicated the incompleteness of the record. The evidence did, however, indicate a continuous evolution of the Palaeozoic groups through the Mesozoic and Cenozoic and after.

Among many other general areas of investigation of note the following may be listed: (a) the notable expansion of the early vascular flora of the Lower and Middle Devonian; (b) the structure and reproduction of Coal Measure plants elucidated by many papers based on studies of petrified plants obtained from "coal balls," especially from the collections from the Eastern Interior and Mid-Continent coal deposits of North America and (c) the critical consideration of Cenozoic floras as a foundation for modern plant geography. (See also GEOLOGY.)

(J. H. Hs.)

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Palestine

The Class "A" mandate of Palestine, under Great Britain as administrator, was approved by the League of Nations in July 1922. Palestine is bordered by Lebanon and Syria to the north, Syria and Transjordan to the east, Egypt (Sinai peninsula) to the south and the Mediterranean sea to the west. Its area is 9,193 sq.mi. The administrative center is Jerusalem. Tabulation of the population of the main cities is as follows:

	1942	1945
Jerusalem	142,800	150,000
Tel Aviv	142,200	170,000
Haifa	114,000	125,000
Jaffa	85,000	95,000
Gaza	27,400	29,000
Nablus	21,500	25,000
Hebron	21,500	25,000

The Mandate recognized three official languages: English, Arabic and Hebrew. Arabic is the spoken language for about two-thirds of the population. Jews, however, use German, Polish, Yiddish or other European languages as their home language while Hebrew is stressed in educational institutions. Almost no Arabs know Hebrew, and few Jews speak Arabic freely. There are small Armenian (4,000) and Greek communities who speak their national languages in addition to Arabic.

Islam of the Sunni sect is the religion of almost 1,000,000 Arabs. But there are numerous small sects, such as the Shia'h (about 5,000), the Druze (11,000) and the Bahai (450). The more orthodox Jews are members of the Mizrahi and the Agudath Israel organizations, but all shades of Reformed and Liberal Jews exist side by side with members of socialistic political parties such as Poale Zion and Hashomer Hatzair, which consider religion merely a phase of cultural development. Practically every sect of Chris-

tianity has its representatives in Palestine.

Official statistics showed the following population changes:

	1939	1944	1946 (est.)
Arab Moslem	927,000	1,064,000	1,100,000
Jew	446,000	525,000	600,000
Christian	117,000	136,000	140,000
Others	12,000	14,000	14,000
Total	1,502,000	1,739,000	1,854,000

British high commissioners during the decade 1937-46 were: Sir Arthur Wauchope (1935-Feb. 1938); Sir Harold MacMichael (March 3, 1938-Oct. 30, 1944); Lord Gort (Oct. 31, 1944-Nov. 7, 1945); Sir Alan Gordon Cunningham (after Nov. 8, 1945).

Peel Partition Plan.—On Aug. 27, 1936 King George V had empowered a royal commission headed by Earl Peel to study and make recommendations concerning the situation in Palestine. But so fierce was the violence there that it was mid-November before they arrived. They found "two nations warring," separated by a wide gulf difficult to bridge. There had been four previous "Arab revolts," in 1920, 1921, 1929 and 1933 but the fifth, which began in April 1936 and ended with a truce on Oct. 12, had been the most intense. The basic causes of all the revolts had been the same: viz, (1) Jewish immigration which threatened eventually to inundate the Arab majority and (2) Jewish land purchases which might alienate their lands forever. Discrimination by Jews against Arab labour was an added irritant. Because the Jew was highly subsidized from outside, and decisions were imposed upon the Arab against his will, the Arab had resorted to violence, all other means having failed to halt the tide of incoming Jews. The rise of naziism in Europe had accentuated the rush of Jews to Palestine, causing a rapid fundamental change in the composition of the country's population, economy and political situation. A comparison of statistics for the years 1919 and 1936 shows what changes had occurred:

Year	Arab Moslem	%	Jews	%	Christian	%
1919	515,000	80	65,300	11	62,500	9
1936	900,000	64.3	400,000	28.5	100,000	7.2

Leaders of the Jewish Agency for Palestine in their headquarters at Jerusalem in 1943. At the extreme right is the chairman, David Ben-Gurion, a Pole



Jewish-held land had doubled, and solidly Jewish cities had appeared. Immigration had accelerated from a few thousand a year to 61,854 in 1935. David Ben-Gurion, chairman of the Jewish agency executive, proclaimed at the World Zionist congress in Lucerne in Aug. 1935 that the Zionists had plans to bring in 5,000,000 Jews in the next ten years. Other Jewish leaders, especially Vladimir Jabotinsky, leader of the Revisionist party, demanded a revision of the borders of Palestine to include all of Trans-Jordan in the anticipated Jewish commonwealth. Two incidents also exposed large-scale smuggling of modern arms from Europe to Jews. All these had combined to make the Arab national struggle far more than a local problem. The Jews interpreted the Balfour declaration to mean that they had unlimited rights to migrate to Palestine and to make it "as Jewish as England is English or France is French." In his memorandum on British policy issued in 1922, Winston Churchill had expressly denied any such interpretation.

After two months of intense study, the Peel commission returned to the United Kingdom and on July 7, 1937, published its voluminous findings. Because of its main recommendation, it became known as the Peel Partition plan. It suggested division of Palestine into three sections: (1) A Jewish state roughly consisting of northern Galilee and the coastal plain starting northward at Tel Aviv; this was to contain 300,000 Jews and 200,000 Arabs. (2) A mandated enclave including the holy places of Nazareth, Jerusalem and Bethlehem with a corridor to Jaffa. (3) An Arab state including all not delineated above, which would be united to Trans-Jordan. A transfer of populations would subsequently exchange Arabs with Jews so as to form solid racial blocs within the respective states. On July 7 the house of commons resolved to bring the proposal before the League of Nations. On July 8 the Arab Defense party rejected the plan and demanded a cessation of Jewish immigration, of land sales to Jews, a termination of the mandate and recognition of an Arab sovereign state. The Arab states were unanimously opposed to the plan. Jewish groups were split, some favouring "half a loaf" rather than none, but the World Zionist congress expressed the view that it was contrary to the Balfour declaration. A pan-Arab conference held at Bludan, Syria on Aug. 11 set up a permanent organization to combat political Zionism which they denounced as a tool of British imperialism. Amidst mounting tension a band of Arabs ambushed the British commissioner for Galilee, Yelland Andrews, on Sept. 26. His assassination precipitated the most acute phase of the "Arab rebellion."

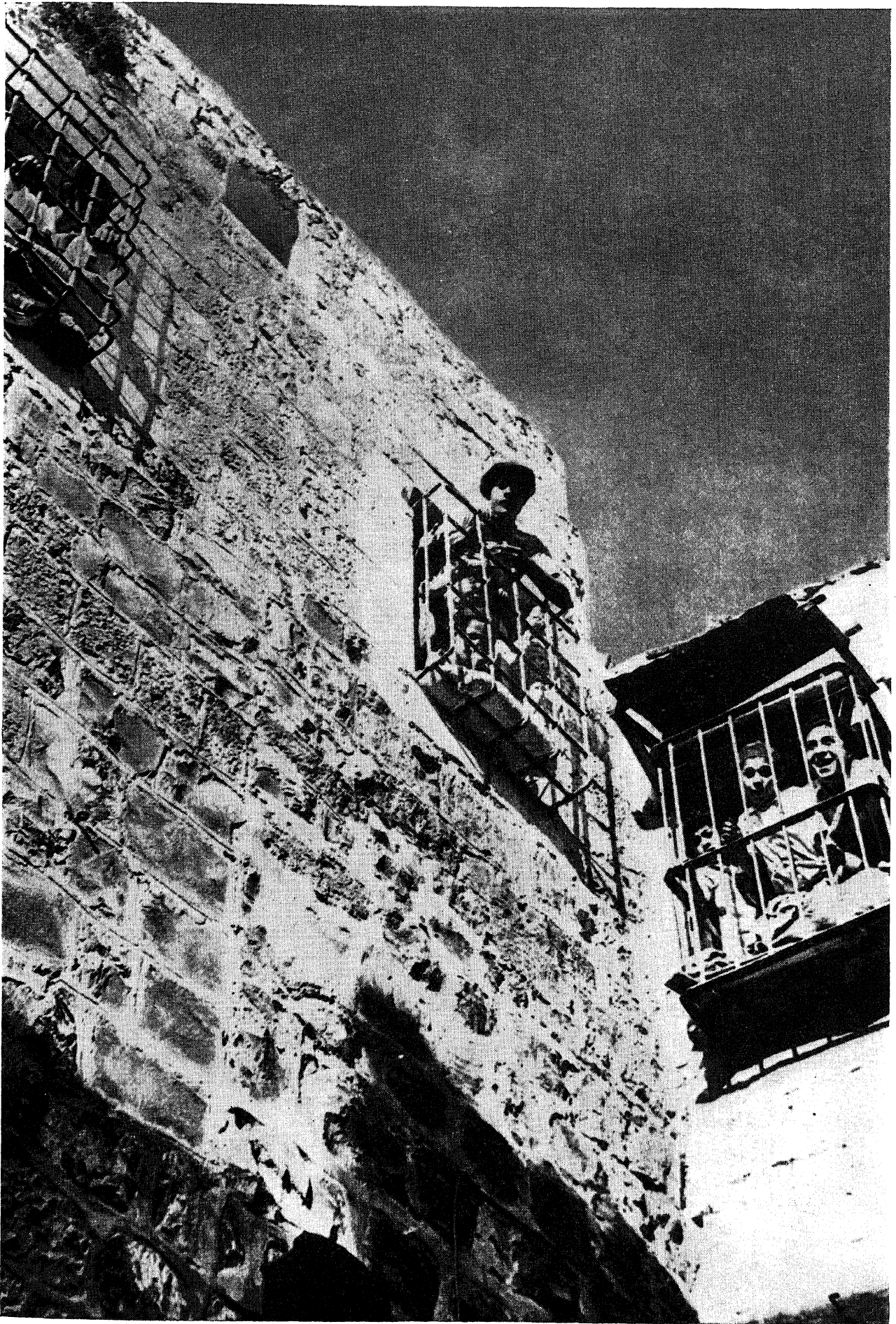
There were in existence four types of "armies": (1) British empire troops who numbered almost 30,000 before the end of 1937; (2) legally-armed dominantly Jewish police and gendarmerie augmented by from 3,000 to 5,000 supplementary police who acted as a local militia; (3) illegally-armed Jews belonging to two organizations and numbering possibly 50,000. The larger organization later became known as the Hagana (Defense) and was passive in nature at that time. Its purpose was to hold off raids until assistance from legal forces might arrive. The smaller, more compact aggressive "army" was the military branch of the Revisionist (New Zionist) party under the leadership of Jabotinsky. Later to be called the "Irgun Zvai Leumi," this force was organized on fascist principles, operated underground and numbered from 3,000 to 4,000. (4) The largest was composed of illegally armed Arabs who were partially armed, financed and trained by Arabs

from abroad. Most notable of the latter was Fawzi-ed-Din al Kawukji, a Syrian pan-Arabist who had fought the Turks, earned a Legion of Honour from the French as an intelligence officer, then in the Druze Rebellion of 1925 had fought the French and was condemned to death by the latter. He escaped to Saudi Arabia and later volunteered in the Iraq army from which he resigned in 1936 to take up the "Arab struggle" as leader of the guerrillas in north Palestine. The Arab arms were nondescript and their organization loose.

On Oct. 1, 1937, the British struck at the Arab Higher committee, exiling most of its members to the Seychelles Islands. Haj Amin Al Huseini, the Grand Mufti, who was chairman, took asylum in the Holy Mosque and on the 16th, eluding guards, he escaped to Jaffa, thence proceeding up the coast in a small boat, to Beirut. Outrages and pitched battles broke out all over Palestine. Arabs primarily attacked the British but often vented their rage on Jews. Revisionists carried the war to the Arabs, setting delayed-action bombs in Arab theatres and markets. On Jan. 4, 1938, the British postponed approval of the Peel plan and assigned a new commission under Sir John Woodhead to formulate a specific program to implement the plan. It made a study of three possible plans of partition and eventually declared them all unworkable. This the Arabs boycotted. On March 3, the new high commissioner, Sir Harold MacMichael, arrived but the "war" intensified. Although they had suffered great casualties, the Arabs put forth their greatest effort in October, capturing several cities including Bethlehem and the old city of Jerusalem. They were recaptured by the British on the 10th and 18th respectively. This marked the weakening of Arab resistance. Leaders of neighbouring Arab states had been urging conciliation for months. Also an extremely mobile military force, unorthodox in method, well disciplined and developed by the brilliant but eccentric British Zionist, Orde Wingate (Brigadier Wingate was killed in Burma in 1944) had trapped and liquidated many of the Arab guerrilla leaders. Arab finances and arms were nearing exhaustion. Official figures for 1938 stated that 77 British, 255 Jews and 503 Arabs were killed with 216, 390 and 598 respectively wounded. But the Arabs hid many of their casualties, which must have been nearly double those figures.

"White Paper" of 1939.—Two factors combined to cut down Jewish immigration. In 1937, Benito Mussolini had openly challenged the British position in the Mediterranean while the revolt had retarded economic development. Only 10,536 immigrants entered in 1937 and 12,868 in 1938. Britain's world position demanded that Palestine should be quiet. To formulate policy a conference was held in London Feb. 7 to March 17, 1939, to which both Arabs and Jews were invited. But in spite of offers of outside mediators, neither Jews nor Arabs would accept British suggestions. One tangible result was the belated publication of the controversial McMahon-Husein correspondence of 1915-16 on which the Arabs based their original claims. Following further deliberation, the British on May 17, 1939, issued a "White Paper." It reiterated that the Balfour declaration had never envisaged conversion of Palestine into a Jewish state against the will of the Arabs. It recommended that within the next ten years, both Jews and Arabs be systematically promoted in responsible positions so as eventually to form a Palestinian state; that Jewish immi-

Scene in Jerusalem as Jewish inhabitants sought refuge behind heavily barred windows during the Arab-British skirmishes preceding arrival of British troops in the city in Oct. 1938





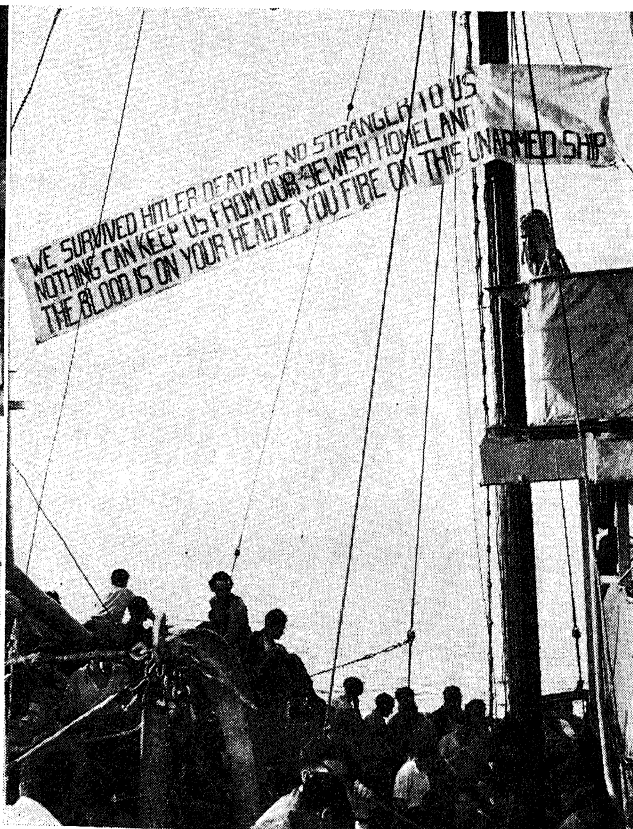
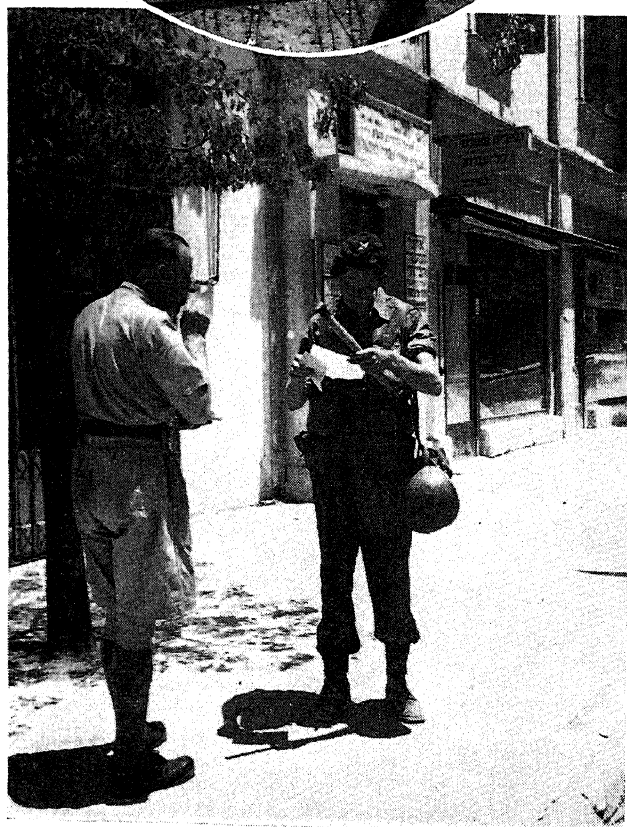
Above: Roundup of illegal arms collected by British troops who raided a Palestinian town in July 1946, in an attempt to halt acts of terrorism by the Jewish underground



Circle: Barbed wire fencing off a deserted street in Tel Aviv as a British armoured tank patrolled the area in July 1946, to insure observation of curfew regulations

Lower Left: British soldier checking the identification papers of a resident in Tel Aviv, during the curfew imposed on that city and Haifa on June 18, 1946. The restrictive order followed the kidnapping of six British officers by Jewish extremists in Palestine

Below: Illegal immigrants aboard the "Josiah Wedgwood" which sailed from Genoa, Italy, with 1,290 European Jewish refugees and was intercepted at Haifa by British authorities on June 27, 1946



gration be limited to 75,000 over the next five years and subsequently conditioned upon Arab acquiescence and, thirdly, that land sales to Jews be restricted. The Land Transfer Regulations of 1940 authorized freedom for Jews to buy land in the zones where Jews were most numerous, limitation by licence in the zones where Jews were a minority and prohibition in regions almost solidly Arab. The White Paper policy was approved by the two houses on May 22-23, but a majority of the League of Nations Mandates commission questioned the validity of the White Paper recommendations. Arabs tacitly accepted the policy as a hopeful move but never approved of it officially. But the White Paper was the *bête noire* of Zionists, inasmuch as the freezing of immigration doomed Jews to a permanent minority of only one-third of the population. It was considered a death sentence to hopes of Jewish statehood.

World War II Ends Strife Temporarily.—War in Europe brought peace to Palestine. The high commissioner appealed to all factions to forget their differences, and the great majority agreed. But there was one exception. A tough nucleus of Jabotinsky's "army" was led by Abraham Stern, graduate of the Hebrew university and later the University of Milan. From Italy he brought back indoctrination in the "black-shirt" technique of organizing cells of terrorists. Once he had been captured by the police but was released in a general amnesty in 1939. To him and his followers, Italian fascism was less of a danger to the goal of a Jewish state than was the British empire. Jabotinsky died in 1940 and his organization fell apart, the political branch continuing under the leadership of Dr. Arie Altman, while the "army" split into the Irgun Zvai Leumi under Polish refugee leadership, and Stern, who carried about 400 "commando" personnel with him, calling themselves "Fighters for the Freedom of Israel." To finance their crusade, they levied heavy assessments on Jewish individuals and institutions, using bombs or kidnapping as persuasion in case there was hesitation. Even a high-ranking Jewish police official was murdered for interfering with their methods of extortion but in 1942, Stern was trapped and liquidated while most of his lieutenants were imprisoned—for a short while.

Other groups co-operated well with the British, especially after the fall of France in June 1940. Small Jewish units served with the British army in the campaigns in Iraq, Syria and the desert in 1941. There was a great deal of agitation for the organization of a Jewish army, enthusiasts arguing that 200,000 could be recruited in the United States alone, but the British did not act until 1944, when a Jewish brigade was trained in Egypt. This was not popular with the Jews and recruits failed to complete the 6,000 expected. The unit saw action the last week of the war on the north Italian front. Eventually about 25,000 Jews were recruited in various British formations, such as the transport service and the royal air force. About 9,500 Arabs volunteered. Naturally Palestinian economy expanded with the war. Immense contracts were let to supply the British 8th and 9th armies. As the Jewish community was far better prepared industrially, it received the lion's share of the accompanying prosperity. The greatest damage came to the citrus fruit industry, whose markets were cut off by the war.

Limitation of Jewish immigration into Palestine added to the terrors of anti-Semitism in Europe and resulted in the phenomenon of "illegal" or "unauthorized" immigration. Jews were encouraged to escape from Europe on obsolete boats, veritable deathtraps, which sailed for Palestine without quota assignments. At first the British tried to turn back some of these ships or transport the immi-

grants to other places, such as Mauritius, but later they were allowed to land their passengers and have them charged against the quota. Two tragedies occurred in the meanwhile. In Nov. 1940, the "Patria" was tied up at the Haifa dock, loaded with 2,000 deportees. Zionist sympathizers decided to prevent the sailing and scuttled the ship, but it capsized and drowned 252 of the refugees. In Dec. 1941, the S.S. "Struma" left a Black Sea port and was detained in the Dardanelles, then on Feb. 23, 1942, was ordered back to the port of sailing. An explosion sank the overloaded vessel the next day with a loss of 700 lives. Underground methods of smuggling in Jews continued throughout the war, estimates varying between 4,000 to 6,000 a year.

In 1942 there was a large-scale effort to enlist the influence and wealth of the 5,300,000 Jews in the United States in the Palestine cause. David Ben-Gurion, chairman of the Jewish agency executive, toured the country and presented his recommendations to the U.S. Zionists assembled in New York. On May 11 they approved his "Biltmore program" which repudiated the White Paper policy, for the first time called for the recognition of a Jewish commonwealth and a Jewish army, urged that responsibility for immigration be vested in the Jewish agency and restated the necessity to co-operate with the Arabs. Many Jews in Palestine opposed the Biltmore program. The left-wing parties, Hashomer Hatzair and Poale Zion, and some moderates were alarmed by its scope, but the Revisionists and the Jewish agency succeeded in having it endorsed by a committee of the general council of Zionists on Nov. 10, 1942. In the U.S.A., resolutions favouring Zionist goals were presented to state legislatures and pushed in both houses of congress, most of them being passed in routine manner. Lest it immobilize Allied forces in the middle east, the senate resolution was finally delayed because of military considerations, in anticipation of the invasion of France.

Thefts of arms became notorious during 1943. In the spring, two British army deserters were given large sums of money and all the necessary forged countersigned documents to steal lend-lease arms by the truckload. Apprehended later, they indicated that two Jews had suborned them. In September a trial was held which made clear that some large Jewish organization with vast ramifications within the British army was at work. Only one bullet was recovered. The Jew in whose home the bullet, along with pads of British army requisition blanks, was found, received a prison sentence. The two Britishers and two Jews they implicated were also given prison terms. All the Jews were later released.

At the same time, the Polish army was in training in Palestine. Because of strong traditional anti-Semitism in Poland, about 3,500 Jews within the Polish ranks seized the opportunity to desert, often with arms. They were quickly absorbed by the Jewish community. Searchers for the deserters were impeded, and a non-co-operative attitude was adopted by the settlers. In late 1943 this resulted in violence in two cases at the settlements of Hulda and Ramat Ha Koveshe and an attitude of hostility between Zionists and the government became noticeable.

Rise of Jewish Terrorism.—In Dec. 1943 there were two jail breaks by which the interned leaders of the Stern group escaped. Early in 1944 both the Stern group and the Irgun Zvai Leumi began a series of attacks on the British. The former shot to kill, while the latter indulged in blasting government installations, often trapping police



Samaritans, one of the world's smallest ethnic groups, observing Passover ceremonies atop Mt. Gerizim, Samaria, in 1946

inside. Leaflets were frequently distributed, attempting legally to establish these "armies" as underground forces of liberation operating against the oppressor nation, Britain. On Aug. 8 an attempt was made to assassinate the high commissioner by ambushing his car, but it failed. Two members of the Stern group, using British uniforms, went to Cairo and on Nov. 6 shot Lord Moyne, British minister of state in the middle east. The murder was defended as an act of patriotism. As the tempo of outrages increased, responsible Jewish leaders decried the methods adopted by extremists but declared that they could not discipline them. Meanwhile the Arab league was being formed, and although the various Arab parties showed little sign of general co-operation, they all approved of Musa El Alami to represent Palestinian Arabs at the Alexandria conference which met in late Sept. 1944. Following the Yalta conference in Feb. 1945, at separate sessions President Franklin D. Roosevelt and Prime Minister Churchill met the various heads of the Arab states in Egypt where the problem of Palestine was discussed. After the meeting, Abdul Aziz Al Saud, king of Saudi Arabia, wrote a long letter to President Roosevelt outlining the Arab claims, to which the president replied that he would take no action in regard to Palestine without consulting the Arabs. The letter, dated April 5, was published on Oct. 18 and raised a storm of criticism among Zionists.

That the end of the war in Europe would bring trouble to Palestine had been prophesied by Ben-Gurion as early as March 20, 1943. In a speech made at Tel Hai, he ex-

horted Jewish youth to prepare themselves for the fighting which would fall to their lot at the end of the war. This "war" was to start over the question of immigration. It began when the White Paper quota of 75,000 Jewish immigrants had been exhausted. Late in 1945 the British announced that they would continue to authorize a quota of 1,500 a month despite Arab protests. But Zionists ignored any legal quotas and in Dec. 1945 there emerged a highly organized pattern of illegal immigration from ports in southern Europe. Operated clandestinely, boatloads of Jewish refugees would approach the shore at night. A spearhead of Jewish "commando" troops would clear British shore patrols from a selected stretch of beach and attempt to escort the passengers ashore. Numbers of British police were killed in these actions. Attempts to follow the attackers to the Jewish settlements met with resistance, and more deaths followed. Following Dec. 1945 there were widespread and frequent raids upon the railways, train robberies, attacks upon British posts by Jews dressed in British uniforms and dynamiting of government installations.

Palestine was the focal point upon which converged a number of world forces. First in magnitude was the pressure engendered by the appalling nazi plan which had eliminated 75% of European Jewry. The remaining 1,500,000 Jews constituted a pool of potential immigrants to other countries. But no other country indicated an interest in taking these refugees while the Zionists redoubled their efforts to channel them all toward Palestine. Zionist spokesmen presented but failed to place on the agenda of the United Nations in May 1945 a program urging a joint agreement by the great powers to impose their will upon the Arabs by recognizing a Jewish state at once, formally declaring the Jewish agency as the provisional government of that state, granting an international loan to transfer to and settle the first 1,000,000 Jews in Palestine, collecting reparations from Germany for the reconstruction of Palestine and establishing international facilities for the transit of all Jews who wished to settle in Palestine. This maximal program was adopted by the World Zionist conference meeting in London in Aug. 1945.

Anglo-American Committee.—On Aug. 31, President Harry S. Truman wrote to Prime Minister Clement Attlee suggesting that 100,000 Jews be admitted at once to Palestine to alleviate the situation in Europe. Though this was refused, Attlee suggested the formation of a Joint Anglo-American committee to study the entire problem and make recommendations. This was done, and a commission of 12 spent the winter in Europe and the middle east, producing their report on April 20, 1946.

The first recommendation of the Anglo-American committee stated that no country other than Palestine gave hope of substantial assistance in finding homes for refugee Jews. Wherefore the second recommendation was that 100,000 certificates be issued at once for displaced Jews to enter Palestine, in 1946 if possible. The third recommendation denied the exclusive claim of either Jew or Arab to a state in Palestine, while the other seven recommendations, though of equal importance, were lost sight of in the clamour that arose over the second.

The Arab leaders were becoming alarmed. They met in Jerusalem in Nov. 1945 and reconstituted the Arab Higher committee. The kings of Egypt and Saudi Arabia met in Feb. 1946. Almost simultaneously, the British announced a decision to recognize the independence of Trans-Jordan. Zionists protested this vigorously, claiming that the separation of Trans-Jordan in 1923 had been a violation of the Palestine promises made to the Jews.

Declarations pro and con were issued, but on May 25, 1946, the British proclaimed the Amir Abdullah ibn Husein of the Hashemite family as king of Trans-Jordan. At the same moment, five representatives of rulers of the Arab states were meeting at an estate of King Farouk in Egypt. They issued a communique declaring that the Arab states could under no circumstances accept the recommendation of the Joint committee and called for a special session of the Arab league to meet at Bludan, Syria, early in June. At this session, joint answers were drafted to the United Kingdom and the United States, and plans were made for measures which would "preserve the future" of the Arabs in Palestine. During the last days of the conference, the news that the Grand Mufti had "escaped" from France electrified the Arab world. His travels had taken him to Beirut (1938-40), Baghdad and Tehran (1941), then to Rome and Berlin (1941-45) from where his voice had often been heard over the axis radio, finally to France (1945-46), then back to Cairo, where he sought asylum on June 19, 1946. Other interned Arab leaders had been released after the surrender of Japan.

Following the publication of the Joint commission report, Jewish "terrorist" forces had announced that they would cease their attacks if recommendation two were implemented at once. The position of the British Labour government was a complicated one. In Dec. 1944, in its

Jerusalem pedestrians scrambling for cover after the explosion of land mines in the King David hotel (here obscured by smoke) on July 22, 1946. The mines were planted by the Irgun Zvai Leumi and resulted in 91 deaths

election platform, the Labour Party had introduced a plank favouring a Jewish commonwealth in Palestine and encouraging "the Arabs to move out as the Jews move in." Two years later, overburdened with the commitments of the post-war world, the British were favouring the freedom of the Arabs in Syria and Lebanon; they were negotiating to withdraw troops from Egypt, promising independence to Trans-Jordan and trying to soothe the Arabs in Iraq. Thus, while all around Palestine their policy was to encourage Arab sovereignty, within Palestine they were being called upon to implement their campaign promises of inundating the Arab population by unlimited Jewish immigration—beginning with 100,000 in 1946. Irrked by mounting criticism (especially from U.S. Zionists), which was echoed by political leaders anxious to get the support of Jewish votes, Ernest Bevin at a Labour conference on June 12 heatedly declared that the question of transferring 100,000 Jews "tomorrow" involved (1) an extra division of security forces and (2) financial demands approximating £200,000,000 (\$800,000,000); he said that New York, from where most of the criticism came, did not seem to want any more Jews there. This proved to be the cue for an unprecedented series of acts of sabotage in Palestine. Jewish "underground forces" destroyed bridges, cut communications, murdered five British officers in their billet in Tel Aviv and kidnapped six others who escaped or were later released. The Palestine government under Sir Alan Gordon



Cunningham, high commissioner after the resignation of Lord Gort in Nov. 1945, suspected that the Jewish agency was implicated in the wave of organized destruction. On June 29, 1946, he threw out a dragnet throughout the Jewish community, including a raid on the Jewish agency. Three thousand suspects were detained, including three members of the agency executive itself. Meanwhile, it was announced in Washington that President Truman had appointed a cabinet committee to formulate a joint program with the British on the recommendations of the Anglo-American committee.

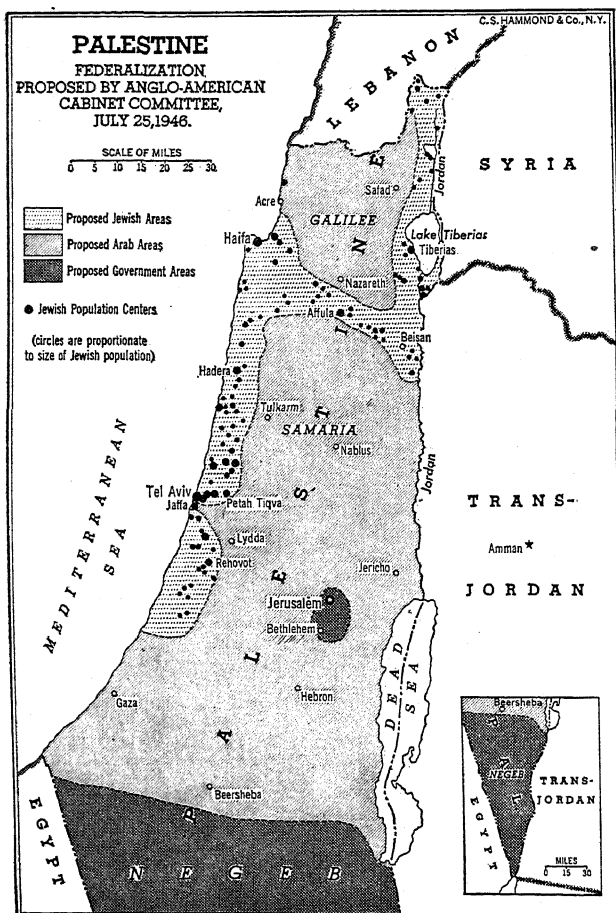
The Thorny Immigration Problem.—To Zionists and Arabs, the immediate problem was the question of awarding certificates for the 100,000 Jewish immigrants. The Zionists felt that if that number could be introduced into Palestine within the year, the White Paper policy would be officially dead and the door would be opened to unlimited immigration in the following years. Then they might attain a majority within another ten years and establish a Jewish state. The Arab states concentrated on defeating this move, unanimously criticized U.S. meddling in Arab affairs, threatened to renew the "Arab national struggle" and hinted that they would take the case before the United Nations. For if they could stop large scale immigration, the Arabs hoped that Jewish pressure would decrease as conditions in Europe became more normal. Then the high birth rate of the Arabs, equalling a natural increase rate of 2.7% per year as compared to the Jewish rate of 0.92%, could guarantee their predominance indefinitely. Meanwhile, efforts were being made to use economic sanctions by boycotting Jewish-made goods and

establishing Arab offices in London and Washington to combat Zionist propaganda.

On July 22, 1946, at noon, a group of 18 members of the Irgun entered the kitchen of the King David hotel in Jerusalem, placed milk cans loaded with gelignite inside and then set the fuse. On the six floors above were offices of the Palestine government and the army. The ensuing explosion was the most disastrous in the history of Palestinian terrorism. Over 90 people, including many senior officials, were killed outright or suffocated in the ruins of the building. The Irgun boasted of its deed while other Jewish groups quickly disassociated themselves.

On July 25 the joint committee in London tentatively agreed to a complex solution, involving a division of Palestine into four provinces: (1) A zigzag strip of land, 20-30 miles wide, running from the north down both sides of the Jordan, then up the Valley of Jezreel to Haifa and down the coast to a point 40 miles south of Tel Aviv, comprising 1,500 sq.mi. in total area, would be granted as a Jewish province. This would be 16% of the whole of Palestine but it would be 90% of the best agricultural land; although it contained 405,000 Jews and 300,000 Arabs, it would be capable of quickly absorbing 100,000 Jewish emigrants if financially assisted from abroad. (2) A British enclave would include the holy cities of Jerusalem and Bethlehem, where the central government under British control would be located. (3) The Negeb or southern triangle in the Sinai desert touching upon Aqaba would remain under British control. (4) The rest, including the Arab city of Jaffa, would be an Arab province but bisected by the Jewish province. Within these areas, there would be a large degree of autonomy but the central government would reserve rights to final authority on currency, security immigration and other general features of government. It was recognized that the Arab province was not viable and would need a subsidy to maintain its population of 900,000 Arabs. Large sums totalling hundreds of millions of dollars would be necessary to finance the scheme over a period of years. Participation of the United States was considered essential to implement the plan. The plan was immediately denounced by all Arab spokesmen. On Aug. 3, the Jewish agency, meeting in Paris, rejected it. It became known that President Truman was dissatisfied with the idea. It appeared that the British would have to revise the plan radically or shoulder it alone.

During the first days of Aug. 1946, British troops carried out the most detailed search of Tel Aviv yet attempted. Several members of the "underground" army were seized, large caches of arms were discovered (one in the basement of a synagogue), and copies of orders were found which the British government claimed incriminated certain members of the Jewish agency executive. The flood of unauthorized refugees coming by sea doubled and trebled. On Aug. 7 the British announced that "illegal" immigrants, approximating 7,000, would be sent to camps in Cyprus. Spokesmen for the Jewish agency proclaimed that no Jew entering Palestine could do so "illegally"; any "illegality" would be involved only in efforts of the British navy to stop them. From various sources the proposal was heard that the Palestine mandate was too heavy a burden for the British to bear and that it should be given to a larger organization, such as the United Nations. In the loud cacophony of conflicting claims and counter claims, that of the Zionist organization was most widely and frequently heard. Its basic message reiterated that the Zionist movement constituted a sovereign state which had a moral authority to rule Palestine regardless of legality, British rule or Arab



Item	1938		1941		1945	
	Value (000's omitted)	Amount or Number £P1 = £1 (\$4.889)	Value (000's omitted)	Amount or Number £P1 = £1 (\$4.032)	Value (000's omitted)	Amount or Number £P1 = £1 (\$4.03)
Exchange rate						
Finance						
Government revenues	£4,898 (\$23,945)		£5,985* (\$22,923)		£17,518 (\$70,599)	
Government expenditures	£7,332 (\$35,847)		£6,005* (\$22,998)		£18,219 (\$73,423)	
National debt . . . . .	...		...		£3,364 (\$13,558)	
Transportation						
Railroads		612 mi.				647 mi.
Highways		2,160 "		2,396 mi.*		...
Communication						
Telephones		16,266		18,357*		22,833
Telegraph and telephone lines		12,065 mi.		...		20,378 mi.
Radio sets		35,708		47,804*		57,749
Minerals						
Potassium salts (crude)		32,032 tons				1,157,470 tons†
Cement		108,516 "				194,555 " †
Salt (other than rock salt)		8,890 "				21,004 " †
Sulphur		1,337 "				...
Crops						
Citrus fruits		557,738 "		12,342 tons		396,828 " †
Other fruits		274,002 "		207,533 "		...
Vegetables		120,248 "		209,210 "		288,188 " †
Fodder for dairy industry		112,892 "		160,453 "		231,469 " †
Livestock						
Poultry		2,660,092‡				1,980,866§
Goats		361,424‡				474,493§
Sheep		209,422‡				339,258§
Cattle		169,145‡				242,945§
Sea products						
Total		1,296 tons				3,102 tons†
Maigre		143 "				138 " †
Red mullet		195 "				434 " †
Sardines		308 "				1,218 " †
Exports						
Total	£5,021 (\$24,547)	...	£1,363‡ (\$5,495)	...	£14,638† (\$59,066)	...
Lemons and oranges	£3,277 (\$16,019)	9,878,000 cases	£33‡ (\$134)	82,949 cases	£1,083† (\$4,290)	1,083,951 cases†
Grapefruit	£474 (\$2,316)	1,798,000 cases	£3‡ (\$12)	9,050 cases	£86† (\$347)	86,262 cases†
Potash	£285 (\$1,393)	53,000 tons	...	...	£876† (\$3,536)	107,000 tons†
Edible oils	£148 (\$724)	4,000 "	£95‡ (\$383)	83‡ tons	£134† (\$540)	1,000 " †
Imports						
Total	£11,358 (\$55,529)	...	£12,047 (\$48,574)	...	£36,224† (\$146,163)	...
Wood and timber	£930 (\$4,546)	8,550,000 cu. ft.	£123‡ (\$495)	465,000 cu. ft.	£159† (\$643)	184,000 cu. ft.†
Cotton piece goods	£323 (\$1,578)	3,000 tons	£598 (\$2,410)	3,000 tons	£651† (\$2,628)	1,000 tons†
Wheat	£296 (\$1,449)	43,000 "	£944 (\$3,807)	78,000 "	£3,250† (\$13,113)	115,000 " †
Motorcars and chassis	£280 (\$1,368)	1,000 "	£115 (\$464)	406 "	£195† (\$788)	120 " †
Education						
Arab public schools		402		402*		404†
Students		49,000		54,367*		56,558†
Private Moslem schools		184		178*		177†
Students		14,052		14,204*		14,751†
Jewish schools (inc. 1 univ.)		663		420*		443†
Students		72,109		58,006*		63,312†
Christian schools		193		195*		189†
Students		24,046		25,274*		25,619†

*1940. †1944. ‡1937. §1943.

†Petroleum products, Dead sea chemicals, chlorine and certain other products withheld from publication and not included in total.

‡1942.

majority. As Britain and the United States embroiled themselves more hopelessly in the complexities of the case, a new question was asked. Would the soviet union exploit Anglo-U.S. conflict and difficulties in the middle east to expedite soviet policy in this vital area? The Zionists strained to hear some encouragement from Moscow, but nothing of value was forthcoming. The Arabs hinted that if invoked the Kremlin would intervene in their behalf. One thing was obvious: No group was happy, none secure and no solution would be satisfactory to all.

On Sept. 9, 1946, representatives of the Arab states met the British government in London. The Jews refused to attend the conference unless the basis of discussion should be recognition of a Jewish state. After two weeks, a stalemate had been reached, but there were rumours that some form of partition was agreeable to most of the moderates. (See also MANDATES.)

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Palmyra Island

See PACIFIC ISLANDS, U.S.

Panamá

Southernmost republic of Central America, Panamá is bounded on the west by Costa Rica, on the north by the Caribbean sea, on the east by Colombia, on the south by the Pacific ocean. It is bisected by the Canal Zone, under perpetual lease to the United States. Area, 28,575 sq.mi., exclusive of the Canal Zone. Pop. (1940 census), 631,637; a later estimate was 635,836. The capital is Panamá city, situated at the Pacific terminus of the canal (pop., 1940 census, 111,893); other important cities are Colón, at the Atlantic end of the canal (pop., 44,393); David (9,222), Chitré (4,790), and Santiago (4,253). The population is concentrated especially in the neighbourhood of Panamá city and Colón. Population density for the entire country, by the census of 1940, was 22.10 per sq.mi. The racial distribution was estimated at 58% mestizo, 17% of European descent, 15% Negro and 9% Indian.

The constitution of March 1, 1946, established a unitary government headed by a president elected by direct, popular vote for a four-year term, to be succeeded, in order, by two vice-presidents, similarly elected for an equal term; a legislative branch consisting of a unicameral national assembly, members popularly elected for four-year terms; a judiciary headed by a supreme court of justice of five members appointed by the president. Presidents

during the decade 1937-46 included Juan Demóstenes Arosemena (1936-Dec. 16, 1939); Dr. Augusto S. Boyd (Dec. 16, 1939-Oct. 1, 1940); Dr. Arnulfo Arias (Oct. 1, 1940-Oct. 7, 1941); Dr. Ricardo Adolfo de la Guardia (Oct. 9, 1941-June 15, 1945); Enrique A. Jiménez, after the latter date.

(R. H. FN.)

Arosemena Opposed.—The year 1937 was marked by an atmosphere of dissatisfaction with the administration of President Juan D. Arosemena, who had taken office the previous year. The Liberal parties supporting the administration of Harmodio Arias, Arosemena's predecessor, had chosen as their candidate Domingo Díaz, who had acquired a large popular following after another Liberal candidate, Enrique A. Jiménez, had given up his candidacy for the sake of party unity and had decided to support Díaz. President Arias, however, was determined to prevent by all means the election of Díaz. A new party called National Revolutionary was hastily formed for the specific purpose of launching and supporting Arosemena. Heads of this party were the president's own brother, Arnulfo Arias, whom he had appointed minister of public works, and the secretary general to the presidency, E. Fernández Jaén. The election showed a clear majority for Díaz, but the official count had to be announced by the electoral college, of which three members belonged to the Liberal party and two to the Revolutionary party. As the count progressed and it was clearly seen that Díaz had the great majority of the votes, President Arias issued a resolution disqualifying one of the Liberal members, surrounded with armed forces the Cabildo building where the electoral college was sitting, prevented the entrance of the ousted member and seated in his place a substitute pledged to the Arosemena candidacy. The majority thus formed counted returns publicly denounced as fraudulent, sent chiefly from the town of Santiago, and declared Arosemena elected president.

Early in March 1938, a cabinet crisis occurred. President Arosemena accepted the resignation of his secretary of government and justice, and appointed his brother, Leopoldo Arosemena, an engineer, to the post. A so-called "cement-bag" contribution was levied, supposedly to be devoted to public works. While no constitutional authority was claimed for it, official committees were appointed to supervise its collection on the ground that it fostered community spirit. In order to finance the Fourth Olympic Games for Central American and Caribbean nations to be held in Panamá city, the national assembly authorized a special issue of government bonds. An ample stadium and a modern swimming pool were built for the competitions, which took place according to schedule. An agreement was reached with the republic of Colombia, after lengthy negotiations, for the final demarcation of the boundary line. The national assembly approved in three consecutive sessions, without debating it, a boundary treaty with Costa Rica signed on Sept. 26, 1938. This treaty, however, was withdrawn from the Costa Rican congress the following year after considerable political pressure in that country. A new income tax law was enacted, which superseded the one in force since 1932.

Public opinion was considerably aroused at the end of 1939 by the news that the government was about to have a new banking law enacted by the legislature. To packed galleries, Secretary of Finance Jaén, who headed the National Revolutionary party during the absence of Arias in Europe, introduced a bill imposing on foreign banking institutions conditions which made their operations prac-

tically impossible in the country. One bank closed its doors; another, which had enlarged its offices in the Canal Zone, immediately reacted by transferring the largest share of its business to territory under U.S. jurisdiction. When the law was substantially modified a few days later, the banking business which returned to Panamá was only a fraction of its original volume.

After the nationalist victory in Spain's civil war in 1939, Franco's troops broke into the legation of Panamá and forcibly arrested numerous Spaniards who had taken refuge there. Panamá immediately protested the action, and ordered its diplomatic representatives to leave Spain at once.

The general treaty with the United States, amending the Canal convention of 1903 and signed March 2, 1936, by Ricardo J. Alfaro and Narciso Garay as Panamá's plenipotentiaries, was ratified by the United States congress on July 25, 1939, despite strong U.S. army opposition. News of its ratification was jubilantly received in Panamá, as the treaty embodied a considerable number of vital rectifications, for which Panamá had fought unsuccessfully since 1904. Gist of the new pact was that the republic was relieved from burdensome obligations imposed by the unequal treaty of 1903, and that the two countries were to share the benefits and the responsibilities of canal operation. Alongside with the general treaty, two conventions were also ratified on such important matters as wireless communications and the construction of a trans-isthmian highway. Interoceanic communication had heretofore been blocked by an old monopoly granted to the Panamá Railroad company which passed to the United States government in 1904. Notes were also exchanged on several important matters, among them the question of military manoeuvres to be held within jurisdiction of the republic.

After war broke out in Europe, the Inter-American consultation system was inaugurated, and on Sept. 23, the first Conference of Foreign Ministers of American Nations assembled in Panamá city. The so-called Declaration of Panamá adopted by the conference established a neutrality and safety zone 300-mi. wide around the coasts of the American continent, where hostilities were not to take place. Great Britain, France and Germany, after being properly notified through the Panaman foreign office, made plain their objections to what they considered a modification of international law by unilateral action of the American nations. The issue passed a crucial test on the occasion of the naval battle between the German pocket battleship "Graf Spee" and the three British cruisers, "Exeter," "Ajax" and "Achilles," a few miles off the estuary of the river Plate, near Montevideo, Uruguay. On Jan. 4, 1940, the Panaman foreign office received a cabled message from Adolf Hitler to the effect that he had ordered an examination to be made of 21 republics' protest for the "Graf Spee" incident.

Agitation started in the republic during 1939 regarding presidential candidates, and Eduardo Chiari, a prominent lawyer, appeared to have the support of three parties and a strong backing of public opinion. President Arosemena squelched the movement by making Arias the official candidate, whereupon Chiari declined the candidacy offered him.

The Arias Dictatorship.—Shortly thereafter, Arosemena died suddenly of a heart ailment in the town of Penonomé, province of Coclé, on the night of Dec. 16, 1939. He was succeeded by First Vice-President Augusto S. Boyd, who flew from Washington, where he had served as Panamá's ambassador. Ricardo J. Alfaro, who was president in

1931-32, answered the call of the opposition parties and decided to run against the official candidate.

On Jan. 25, 1940, Alfaro arrived in Panamá city to inaugurate his campaign for the presidency in opposition to the official candidate, Arias. An impressive demonstration given him on his arrival was dispersed by platoons of mounted police who charged the crowds; scores of citizens were injured or jailed. In a letter addressed to President Boyd, Alfaro pointed out that acts of violence and intimidation were being carried out by government officials and particularly by the armed forces in behalf of Arias, and demanded constitutional guarantees of free and fair elections.

Under the pretext of smashing a planned coup to overthrow the government, the police force, after arresting leaders throughout the country, made an attempt to arrest Alfaro and his principal followers, most of whom fled to the Canal Zone. On May 31 Alfaro asked his followers to refrain from going to the polls, stating that under the prevailing terrorism no free election was possible. Voting took place in June 1940 with no candidate except Arias, who was declared elected for the four-year term and took the oath of office in the Olympic stadium on Oct. 1. The following day he delivered a radio address which contained threatening references to Washington. Notwithstanding Arias' oath to uphold the constitution, he immediately submitted to the national assembly a draft of a new charter which extended his term of office till Jan. 1, 1947, and superseded *in toto* the constitution of 1904, which could only be amended by two consecutive legislatures. In order to give his own charter immediate effect, Arias had it approved by a so-called "plebiscite," for which only "yes" ballots were printed. Those who voted "no" faced imprisonment for "defacing a public document."

The new constitution was proclaimed for the republic on Jan. 2, 1941. Two justices of the supreme court who had questioned the legality of the Arias charter were ousted. The new constitution gave the executive strong powers and provided an easy method for amendment. It disfranchised Negroes of West Indian origin born in the

country. A general policy of regimentation and intimidation was started which resulted in a thoroughly cowed citizenry. The laws on the nationalization of retail trade were enforced in a high-handed manner through which some of Arias' followers acquired the businesses of ousted foreign merchants at confiscatory prices. Gambling flourished, and numberless slot-machines operated in the cities of Panamá and Colón. An entire colony of Swiss farmers in the province of Chiriqui were shot to death by the police on flimsy pretexts. The pro-axis, anti-Allied sympathies of the Arias regime were shown in several ways, notably in its refusal to allow merchantmen under the Panamá flag to arm themselves for defense against German submarines.

On Oct. 8, 1941, President Arias surreptitiously left the country without asking leave of the supreme court, as required by his own constitution. When his departure became known to the public and to the responsible officials of the government, there was an outburst of the country-wide sentiment against the dictatorship. Vice-Presidents Jaén Guardia and José Pezet resigned, whereupon the supreme court declared the presidency vacant, and Ricardo Adolfo de la Guardia, Arias' minister of government, took the oath of office as president Oct. 9. The fall of the dictator was wildly celebrated. A pro-Allied foreign policy was started, and Panaman merchantmen were permitted to arm for defense. Immediately after the Japanese attack on Pearl Harbor on Dec. 7, Panamá, bound to the United States by treaty relations and by continental solidarity, declared that a state of war existed between Panamá and Japan, even before the United States congress did, and proceeded diligently to round up Japanese nationals. Shortly afterward, war was also declared on Germany and Italy. Switzerland later agreed to represent the interests of Panamá in Germany, Italy and Japan.

Wartime Prosperity.—Owing to the huge military works undertaken for the defense of the canal, an era of unprecedented prosperity dawned on the country in 1942 despite the sudden death of the tourist trade brought about by the war. Studies and preliminary work for a third set of canal locks were also begun. After lengthy negotiations,

Construction work on a camp in Panamá by U.S. "Bushmaster" jungle troops in 1942



an agreement on defense sites was signed in Panamá city between Panamá and the United States. On May 18 an exchange of notes took place in Washington transferring to Panamá the waterworks and sewer systems in the cities of Panamá and Colón built by the United States for account of Panamá and paid in excess by the republic. Another agreement was reached for the transfer to the republic of all city lots in Panamá and Colón which the Panama Railroad company had held in usufruct and which were to revert to the United States government in 1966.

The year 1942 was marked by official visits from President Manuel Prado of Peru (in May) and President Arroyo del Río of Ecuador (December).

Submarine warfare, brought very close to Panaman shores in 1942, considerably decreased the volume of shipping in 1943 and materially increased the cost of living in Panamá. In order to cope with this and other similar problems, Jiménez, who had held important government positions in his long career, was appointed ambassador to Washington. Octavio Méndez Pereira, who had left the country in 1940 upon the election of Arias, returned to Panamá as rector of the university, replacing J. B. Duncan, who resigned after a student strike late in 1942. A congress of ministers of education of the American nations was held in Panamá city. Among the important agreements reached, a convention was signed creating an Inter-American university in Panamá, conceived as a centre of Inter-American studies, to be supported and controlled by all American nations.

Return to Democracy.—In 1944, a commission was appointed by President de la Guardia to prepare a draft constitution to supersede the charter of 1941. The three-jurist body of Alfaro, Chiari and J. D. Moscote presented their draft after considerable study and intensive work. Political unrest, meanwhile, was growing because of the struggle between friends of De la Guardia, who proposed that no election of vice-presidents be held until 1947, and a number of assemblymen, very close to a majority, who meant to elect another person in his place. In this situation the parties supporting the administration, urged President de la Guardia to declare the self-evident illegality of the constitution of 1941, to dissolve the assembly, and to call a free and fair election by virtue of which the legitimate representatives of the Panaman people, acting as a constitutional

convention, should give the nation a charter which represented the will of the people. De la Guardia acted accordingly, whereupon the opposition assemblymen went to the Canal Zone and on a spot near the border pretended to elect three vice-presidents. As they had no popular backing, this gesture failed to have any effect on the people of Panamá. De la Guardia set up a so-called "Cabinet Government," formed by members of all the parties supporting the constitutional movement. This government proceeded at once to take the necessary steps to carry out the election of a constitutional convention, and De la Guardia announced his decision to give up his powers on June 15, 1944, the day on which the convention should elect a provisional president to succeed him. In 1945 Foreign Minister Roberto Jiménez, Alfaro and Pereira were appointed to represent Panamá at the United Nations conference on international organization in San Francisco.

After intense campaigning, the elections of 1945 were held in an orderly manner, and an honest count was made with the result that a constitutional convention was elected in which a large majority went to the Liberal parties. The constitutional assembly proceeded to elect Enrique A. Jiménez as provisional president on June 15, when he took the oath of office. The convention proceeded at once to discuss the draft prepared by the three-jurist commission. A cabinet representing all parties supporting the adminis-

Panamá: Statistical Data						
Item	Value (000's omitted)	1938	1940	1944		
		Amount or Number	Value (000's omitted) Amount or Number	Value (000's omitted) Amount or Number		
Exchange rate						
United States		1 Balboa—\$1.00	1 Balboa—\$1.00	1 Balboa—\$1.00		
Great Britain		4.88 Balboas—£1	3.83 Balboas—£1	4.035 Balboas—£1		
Finance						
Government revenues . .	\$10,320 (\$2,111)		\$22,795* (\$5,952)	\$27,198 (\$6,741)		
Government expenditures .	\$10,635 (\$2,175)		\$22,795* (\$5,952)	\$26,280 (\$6,513)		
National debt . . . . .	...		\$20,021 (\$5,227)	\$18,497 (\$4,584)	
Communication						
Telephones		7,083††	6,640§	8,975		
Minerals						
Gold		4,867 oz.				
Platinum (crude)		267 "				
Salt		3,673 tons				
Crops						
Rice		42,108 tons		149,570 tons||		
Yucca . . . . .		...		130,458 tons||		
Corn . . . . .		...		85,687 tons||		
Livestock						
Poultry		150,043	...	43,101||		
Cattle		148,368	450,000	333,960||		
Forest products						
Balata		12 tons†				
Mahogany		27,107 sq.ft.†				
Caoutchouc		143 tons†				
Sea Products						
Tortoise-shell		7 tons				
Manufactures						
Sugar		11,684 tons				
Exports—total	\$3,744 (\$766)	...		\$4,507? (\$1,118)		
Bananas	\$2,755 (\$564)	6,400,000 bunches		\$2,048? (\$508)		
Cacao	\$442 (\$90)	4,000 tons		\$103? (\$26)		
Imports—total	\$17,651 (\$3,610)	...		\$45,648? (\$11,327)		
Textiles	\$1,122 (\$229)	...		\$2,689? (\$667)		
Clothing	\$1,103 (\$226)	...		\$4,794? (\$1,190)		
Automobiles and parts . .	\$780 (\$160)	172,391		\$924? (\$229)		
Education						
Primary schools		6298	670||			
Enrolment		61,7068	74,039			
Secondary schools		76	29			
Enrolment		3,8308	8,407			
Universities		18	1			
Enrolment		4118	857||			

*1939 and 1940 revenues and expenditures are on a biennial basis.

†Includes Canal Zone.

‡No date given.

§1941.

||1942.

¶Exports only.

§1945.

§1939.

tration was appointed by President Jiménez with Carlos Sucre in the ministry of government and Alfaro in the foreign office. The government authorized the return of Arias to the country. Arias was noisily welcomed by his followers, but on Dec. 22, 1945, an attempt to capture the police headquarters in Colón resulted in the deaths of several policemen and assailants. The government discovered connections with similar plots in Panamá city, for all of which the Arias' political machine appeared responsible. As a result, Arias and a number of his followers were jailed. The constitutional assembly set Jiménez' term of office to Oct. 1, 1948, and on March 1, 1946, the new constitution was solemnly proclaimed. Following proclamation of the country's third constitution, the assembly became a legislative body for the passing of ordinary statutes. The new constitution was characterized as thoroughly democratic and liberal. Its social and labour provisions were highly advanced; a civil service system was established and retail business was reserved to Panaman citizens, but without affecting foreign interests already established. A students' strike to oust the minister of education was unsuccessful. The most significant political fact was the unification of all the Liberal factions into a single party, an achievement largely due to the efforts of President Jiménez and Francisco Arias Paredes, a prominent leader who died July 31, 1946. (See also CENTRAL AMERICA.) (E. A. Jz.)

Too wide for the Panama canal, this floating dry dock was upended and floated through on its side in 1945, a manoeuvre devised by the U.S. naval civil engineers corps

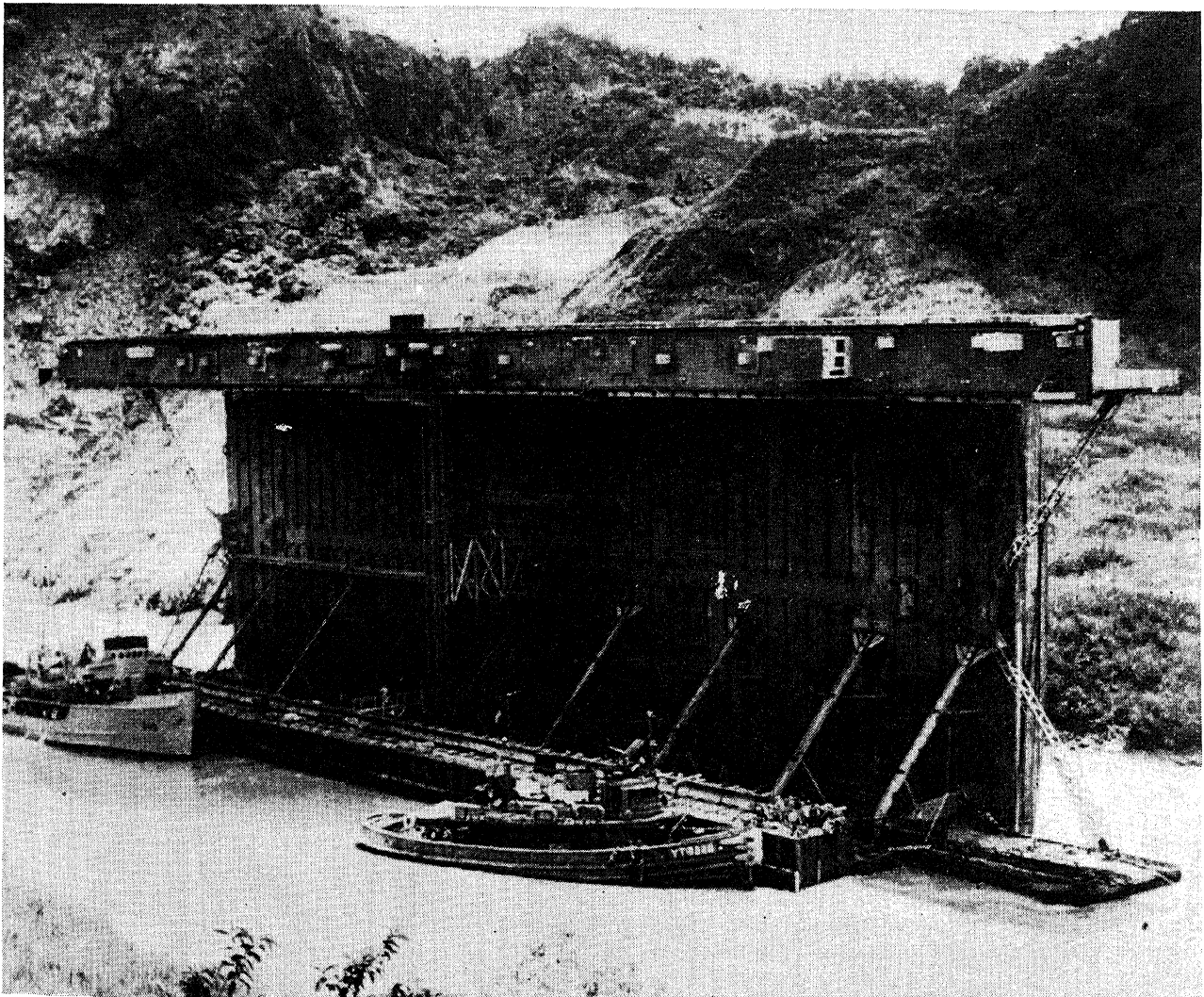
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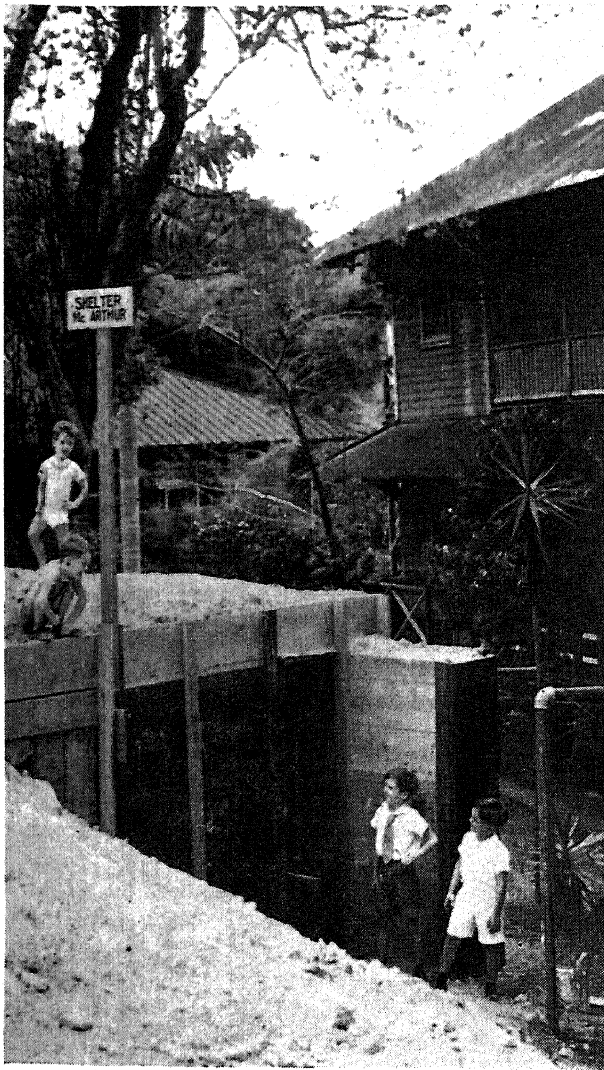
Panama, Declaration of (1939)

See INTERNATIONAL LAW; PAN-AMERICAN CONFERENCES, 1937-46.

Panama Canal and Canal Zone

The Panama canal, one of the world's most important artificial waterways, links the Pacific and Atlantic oceans through the Republic of Panamá. It is 40.27 mi. in length between shore lines and 50.72 mi. between deep water on either side. The canal is constructed through the ten-mile-wide strip known as the Panama Canal Zone, the use, occupation and control of which were granted by the newly established Republic of Panamá to the United States by treaty on Nov. 18, 1903. Area of the Zone is 553.12 sq.mi., of which 190.94 sq.mi. are water area. Population of the Canal Zone in the spring of 1945, exclusive of U.S. army and navy personnel, was 44,688. Figures for the earlier years of the decade were: 1937, 28,707; 1938, 29,063; 1939, 28,978; 1940 (16th census), 51,827; 1941, 42,346; 1942, 55,481; 1943, 57,390; 1944, 47,775. The abnormal figures of 1940 and later were caused by the importation of large numbers of labourers for army, navy and canal work.





Children in the Panama canal zone playing outside one of the air raid shelters constructed there in 1942. Note the misspelling of "MacArthur"

Employees of the canal and the Panama railroad (the latter owned and operated by the U.S. government and built through Zone territory from Panamá city to Colón) are classified as "gold" or "silver," depending on whether they are skilled craftsmen, executives, or professionals or, on the other hand, unskilled or semi-skilled workers. Distribution of employees during the decade (June of each year) was as follows:

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Gold	3,418	3,386	3,052	5,258	7,260	8,550	8,357	6,974	6,685
Silver	10,159	10,413	11,246	18,891	25,994	28,686	26,293	23,040	24,347

The terms "gold roll" and "silver roll" originated during the construction period of the canal from the practice of paying the two groups in gold and silver respectively. The classification was continued, although U.S. currency became the medium of payment for all employees. Some complaint, reputedly stimulated by radical political elements in the Republic of Panamá, arose over alleged discrimination between the two groups of employees.

The Canal Zone administration performs many services for employees and their families, many of whom live in the cities of Panamá or Colón, both under the jurisdiction of the Republic. Panamá merchants frequently complained of the competition and lower prices provided by the Zone commissaries. Commissary net sales during the years 1937-

45 were as follows: 1937, \$8,113,112; 1938, \$8,518,242; 1939, \$8,897,317; 1940, \$12,291,266; 1941, \$19,755,188; 1942, \$35,421,764; 1943, \$46,948,042; 1944, \$39,220,427; 1945, \$38,134,704.

The Panama Canal Act of Aug. 24, 1912, and subsequent acts and executive orders prescribed the civil government of the Canal Zone. Governmental functions were assigned whenever possible to departments established for the operation and maintenance of the canal. The Panama railroad is a separate corporation but operates in close relationship with the canal. In addition to the offices of both the railroad and the canal at Balboa Heights, just outside of Panamá City, the railroad maintains an office in New York City and the canal an office in Washington, D.C. Governors (also presidents of the Panama railroad) during the decade were: Brig. Gen. Clarence S. Ridley, Aug. 27, 1936-July 10, 1940; Maj. Gen. Glen E. Edgerton, July 11, 1940-May 15, 1944; Maj. Gen. J. C. Mehafeff, after May 16, 1944. Governors are customarily chosen from the engineers' corps, U.S. army.

Operation of the canal was fundamentally affected after the outbreak of World War II in 1939 and especially after U.S. entry into the war in Dec. 1941. Extraordinary measures of precaution for the safety of the canal were taken upon the outbreak of war, although details of many such measures were not released. With the entrance of the United States into the war the amount of tolls-free traffic enormously increased. Law and treaty provisions established exemption for all U.S. naval and other government vessels, all Panaman government vessels and all Colombian war vessels. Gov. Mehafeff pointed out in his report for 1945 that if tolls-free vessels had been assessed at prescribed rates, an additional revenue of \$13,000,000 would have accrued to the treasury.

Transits and Revenue, Panama Canal, 1937-45

Year ending June 30	Number of transits	Net tonnage	Tolls	Tons of cargo	Total revenues
1937	5,387	25,430,000	\$23,102,137.12	28,108,375	\$24,163,569.42
1938	5,524	25,950,383	23,169,888.70	27,385,924	24,130,140.18
1939	5,903	27,170,007	23,661,021.08	27,866,627	24,487,615.85
1940	5,370	24,144,366	21,144,675.36	27,299,016	22,329,609.85
1941	4,727	20,642,736	18,157,739.68	24,950,791	19,474,896.14
1942	2,688	11,010,004	9,752,207.38	13,607,444	10,726,003.55
1943	1,822	8,233,999	7,356,684.94	10,599,966	8,916,167.14
1944	1,562	6,073,437	5,456,163.32	7,003,487	7,266,533.67
1945	1,939	8,380,959	7,243,601.58	8,603,607	8,930,555.06

The U.S. congress, by an act approved Aug. 11, 1939, authorized construction of a third set of locks parallel to, but at some distance from the existing locks at Gatún, Pedro Miguel and Miraflores, the existing locks of by-pass channels to connect with the existing canal and other necessary works at a cost not to exceed \$277,000,000. This action followed crystallization of discussion over whether the existing locks should be enlarged, a third set built, a sea-level canal constructed or a Nicaragua canal built. Excavation was begun July 1, 1940, and prosecuted vigorously until May 1942 when, on orders from the secretary of war, work was largely suspended to bring the project into closer conformity with the over-all war program. Dredging in the approach channels was continued on a reduced-priority basis, but other work was postponed. The original project called for an estimated 30,800,000 cu.yd. of "dry" excavation, 31,100,000 cu.yd. of "wet" excavation, 4,900,000 cu.yd. of concrete, 20,400 tons of re-enforcing steel, 86,000 tons of machinery and metal work and approximately 6½ mi. of new channel 42 to 46 ft. in depth. Gov. Mehafeff early in 1946 asked the U.S. congress to authorize a new \$1,500,000 survey oriented to future needs of both defense and shipping. The house of representatives

on Nov. 26, 1945, unanimously passed a bill providing for a governmental investigation of the vulnerability of the canal to atomic bombs and of the possible rebuilding of the canal. John G. Claybourne, superintendent of the canal's dredging division, in an address to the American Civil Engineering society on Jan. 16, 1946, urged the "streamlining" of the canal and construction of a sea-level channel because of bomb danger. Serious geological and engineering objections were advanced from other sources against that proposed solution, however. Capt. Miles P. DuVal, U.S.N., for four years captain of the port of Balboa and author of a book on the canal, suggested construction of a major artificial lake on the Pacific side of the continental divide (as a counterpart to Gatún lake on the Atlantic side) and the subsequent removal of the single-step Pedro Miguel lock at the narrow outlet of Gaillard Cut, combining all Pacific-side locks into one structure as at Gatún.

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Panama Conference, 1939

See PAN-AMERICAN CONFERENCES, 1937-46.

Pan-American Conferences, 1937-46

The number and variety of inter-American conferences continued to grow rapidly during the decade 1937-46. Of 241 official conferences held or scheduled to be held between 1826 and the end of 1946, all but 54 had met since the end of World War I. The number in the period 1937-46 was more than 100. These conferences may be divided into two kinds: political and technical or special. The political conferences may be subdivided into two groups, the regular series of "Pan-American conferences" (of which the eighth was held in Lima, Peru, in 1938 and the ninth was scheduled to be held in Bogotá, Colombia, in 1947), and the restricted conferences convened for consideration of more specialized (but politically important) problems. Of the latter, the Inter-American Conference on Problems of War and Peace (Mexico City, Feb.-March 1945) was an example. The special or techni-

cal conferences may be subdivided into a wide variety of kinds, depending upon the subject matter considered. They usually had a more limited appeal and participation and were considered by the general public as more routine in character; frequently, however, they were very important in terms of further improvement of administrative and other interrelationships of the hemisphere or a portion of it. Perhaps the outstanding such conference during the decade was the Eighth American Scientific congress at Washington in May 1940. Almost every field of organized human activity crossing national boundaries was represented at the end of the decade by some inter-American discussion in the form of official congresses or conferences. These were in addition to many such meetings held under private auspices and with no governmental connection.

Lima Conference.—The Eighth International Conference of American States met at Lima, Dec. 9-27, 1938. It continued the practice of holding these large diplomatic gatherings at five-year intervals, which had begun with the Fifth Pan-American conference at Santiago, Chile, in 1923. Because of the imminence of war in Europe and especially because of the Munich conference which had led to the partition of Czechoslovakia, the Lima conference assumed unusual importance in the popular and official estimation. All 21 republics of the hemisphere were represented at Lima, many of them by their foreign ministers and other outstanding diplomats; United States delegates included Secretary of State Cordell Hull, Alfred M. Landon (1936 Republican presidential candidate), unofficial representatives of organized labour, the Catholic Church and other interests. The conference was characterized by an unusual spirit of cordiality and compromise, although in order to get unanimity of agreement many proposed stands had to be modified to much less significant form. The conference adopted 111 resolutions and recommendations covering a wide variety of matters; it followed the unusual procedure of not drafting any treaties or conventions, partially as a means of avoiding the delay and risk involved in submitting them to constitutional ratification in the various states. The most important action taken was the adoption of the "Declaration of Lima" in which the 21 states reaffirmed and expanded the position taken at the important special conference at Buenos Aires in 1936 in asserting "continental solidarity," and their intention to "collaborate in maintaining the principles upon which it

Delegates in session at the Rio de Janeiro conference where on Jan. 23, 1942, all the American republics pledged adherence to a resolution which recommended severing diplomatic relations with the axis nations





is based" and to defend those principles "against all foreign intervention and activity that may threaten them." A threat against the peace, integrity or security of one republic was a threat against all, the conference asserted. The conference provided for international consultation in case of future critical situations.

Foreign Ministers' Conferences — Panamá, 1939. — The first such occasion for consultation came with the German invasion of Poland, Sept. 1, 1939. The first "Meeting of the Ministers of Foreign Affairs of the American Republics" was quickly convened on the invitation of the government of Panamá (Sept. 23–Oct. 3, 1939). The organization and discussion were more informal than in a full-dress conference, but the meeting was of the greatest significance, not the least because it represented a unanimous and collective approach to the problems of the moment that would have been unthinkable 25 years earlier. The most dramatic action of the conference was the adoption of the "Declaration of Panamá" by which a neutrality or security zone was established within the ocean waters from 300 to 1,200 mi. outside the continental limits south of Canada for the purpose of attempting to prevent belligerent action in such waters. The zone policy did not work well, chiefly because of the impossibility of enforcing it, and little was heard of it after the first few months; its most spectacular violation came in the famous "Graf Spee" incident off Montevideo in Dec. 1939. Perhaps the most important accomplishment of the Panamá conference was the creation of certain continuing administrative agencies, especially the Inter-American Financial and Economic Advisory committee and the Inter-American Neutrality Committee.

Preliminary session of the Inter-American Conference on Problems of War and Peace in Mexico City on Feb. 21, 1945; Ezequiel Padilla (centre) addressing delegates. Argentina was not invited, but later accepted the conference's Act of Chapultepec, pledging mutual aid against aggression

Havana, 1940.—After rapid wartime changes in the spring of 1940, culminating in the fall of France, the second foreign ministers' conference was held at Havana, Cuba, July 21–30, 1940. The important question of the moment was the imminent threat of transfer of French, Dutch and possibly even British territorial possessions in the new world to German control. As at the 1939 meeting, the agenda included a variety of questions under the rubrics of neutrality, protection of peace and economic co-operation. Probably the most important action of the conference was the adoption of a convention and the "Act of Havana," both dealing with territorial transfers. Both were designed to set up machinery, the act temporarily and the convention permanently, for the exercise of a collective trusteeship or "provisional administration" by the republics of the Americas over European possessions in the hemisphere in case change of control should be irregularly attempted. Changes in the course of the war obviated invocation of the machinery, but the action represented a new high in development of inter-American political co-operation on a realistic basis. The conference also adopted, among other actions, a broad statement of policy dealing with economic co-operation.

Rio de Janeiro, 1942.—The involvement of the United States and other American republics in the war led to the holding of the third foreign ministers' conference, Jan. 15–28, 1942, at Rio de Janeiro. This conference was concerned with establishment of a common hemisphere

policy toward the war. After much diplomatic manoeuvring, caused especially by the reluctance of Argentina and Chile to go the full distance urged by some of the Middle American states, the conference agreed to a recommendation of the severance of diplomatic and commercial relations with aggressor nations by the American republics. A majority of the 21 republics had already either declared war on or broken off relations with the axis powers. The conference recommendation was followed immediately by several other severances of relations; Argentina and Chile remained the only American republics not then taking that step. The Rio conference changed the name of the Inter-American Neutrality committee to the Inter-American Juridical committee and enlarged its functions. An incidental but important action of the conference was the mediation that resulted in the settlement of the century-old boundary dispute between Ecuador and Peru.

Special Conference at Mexico City.—The surprise request of the Farrell-Perón government in Argentina in Oct. 1944 for a fourth foreign ministers' conference to consider the relations of the republics of the hemisphere with Argentina led, after protracted diplomatic conversations, to a declination of that request but also to the holding of a specially organized Inter-American Conference on Problems of War and Peace (Mexico City, Feb. 21–March 8, 1945), which, by-passing the regular consultative machinery, permitted the omission of Argentina. The Mexico City (sometimes called the Chapultepec) conference adopted 61 resolutions, recommendations and declarations. Probably the most important was the "Act of Chapultepec," in which, after listing the principles underlying the inter-American system, the conference pledged the signatory states to consult together during the war, on collective measures of diplomatic, economic, or military restraint against aggression from within or without the hemisphere. The inclusion of domestic aggression was highly significant; previous Latin-American fear of U.S. intervention had prevented any such approach, but the nature of the contemporary Argentine regime tended somewhat to shift that fear toward Argentina. The Act of Chapultepec also recommended a post-war permanent treaty embodying similar procedures but with the stipulation that any regional arrangements of the sort must be in harmony with plans for international organization soon to be worked out at the United Nations conference at San Francisco. The Mexico City conference also took steps to remodel the machinery of the inter-American system by providing that regular international conferences should be held at four-year intervals, foreign ministers' meetings each year, the chairmanship of the governing board of the Pan American Union should be rotating, a permanent inter-American economic and social council should be created, etc. Argentina, though not represented at the conference, subsequently adhered to the Act of Chapultepec.

A conference to translate the procedures of the Act of Chapultepec into permanent treaty form was originally planned for Rio de Janeiro for Oct. 1945. Critical political situations in both Brazil and Argentina at that time caused its postponement until March 1946. It was then again postponed until Sept. 1946 and still later indefinitely. (See also INTERNATIONAL CONFERENCES, ALLIED [WORLD WAR II]; INTERNATIONAL LAW; INTERNATIONAL ORGANIZATIONS; PAN AMERICAN UNION.)

Other Inter-American Conferences.—A chronological list of the official inter-American conferences held or scheduled to be held in the period 1937–46 follows. Data are limited to subject matter, number of the conference if in a series, place, and date.

- Neuro-psychiatry, 1st, Santiago, Chile, Jan. 4–11, 1937.
- North American regional radio, Havana, March 15–29, 1937.
- South American regional radio, 2nd, Rio, June 7–20, 1937.
- History, 2nd, Buenos Aires, July 5–14, 1937.
- Coffee, 2nd, Havana, Aug. 9–19, 1937.
- Education, 3rd, Mexico City, Aug. 22–29, 1937.
- Technical aviation, Lima, Sept. 15–25, 1937.
- Radio, 1st, Havana, Nov. 1–Dec. 13, 1937.
- Tuberculosis, 4th, Santiago, Chile, Dec. 15–18, 1937.
- Endocrinology, 1st, Rio, July 1938.
- Sanitary, 10th, Bogotá, Sept. 4–14, 1938.
- Eugenics and homoculture, 3rd, Bogotá, Sept. 4–14, 1938.
- Friends of education, 1st, Buenos Aires, Sept. 12–17, 1938.
- South American botanical, Rio, Oct. 12–19, 1938.
- Municipalities, 1st, Havana, Nov. 14–19, 1938.
- Middle American regional radio, Guatemala City, Nov. 24–Dec. 8, 1938.
- American states (Pan American conference), 8th, Lima, Dec. 9–27, 1938.
- National committees on intellectual co-operation, 1st, Santiago, Chile, Jan. 6–12, 1939.
- Highway, 3rd, Santiago, Chile, Jan. 11–19, 1939.
- Sanitary aviation, 1st, Montevideo, Feb. 2–9, 1939.
- Neuro-psychiatry, 2nd, Lima, March 20–25, 1939.
- Travel, 1st, San Francisco, April 14–21, 1939.
- Foreign ministers, 1st, Panamá City, Sept. 23–Oct. 3, 1939.
- Housing, 1st, Buenos Aires, Oct. 2–7, 1939.
- Nutrition experts, Buenos Aires, Oct. 9–15, 1939.
- Caribbean, 1st, Havana, Oct. 9–12, 1939.
- Treasury representatives, 1st, Guatemala City, Nov. 14–21, 1939.
- American International Labour Organization, 2nd, Havana, Nov. 21–Dec. 4, 1939.
- Radio, 2nd, Santiago, Chile, Jan. 18–26, 1940.
- Architects, 5th, Montevideo, March 4–9, 1940.
- Indian life, 1st, Pátzcuaro, Mexico, April 14–23, 1940.
- National directors of health, 4th, Washington, May 1–8, 1940.
- Scientific, 8th, Washington, May 10–17, 1940.
- Commercial agents, 2nd, Rio, May 25–June 1, 1940.
- Caribbean, 2nd, Ciudad Trujillo, May 31–June 6, 1940.
- Coffee, 3rd, New York City, June 10–July 8, 1940.
- Foreign ministers, 2nd, Havana, July 21–30, 1940.
- Tuberculosis, 5th, Buenos Aires and Córdoba, Oct. 3–17, 1940.
- Maritime, Washington, Nov. 25–Dec. 2, 1940.
- Red Cross, 4th, Santiago, Chile, Dec. 5–14, 1940.
- Rio de la Plata regional economic, Montevideo, Jan. 27–Feb. 7, 1941.
- South American railway, 4th, Bogotá, Feb. 11–21, 1941.
- Endocrinology, 2nd, Montevideo, March 5–8, 1941.
- Geography and history, 3rd, Lima, March 30–April 8, 1941.
- Caribbean, 3rd, Port-au-Prince, April 22–29, 1941.
- Municipalities, 2nd, Santiago and Valparaíso, Sept. 15–21, 1941.
- Highway, 4th, Mexico City, Sept. 15–24, 1941.
- Travel, 2nd, Mexico City, Sept. 15–24, 1941.
- National committees on intellectual co-operation, 2nd, Havana, Nov. 15–22, 1941.
- Foreign ministers, 3rd, Rio, Jan. 15–28, 1942.
- Mining engineering and geology, 1st, Santiago and Valparaíso, Jan. 15–23, 1942.
- Astrophysical, Puebla, Mexico, Feb. 17–25, 1942.
- Child, 8th, Washington, May 2–9, 1942.
- Police and judicial authorities, Buenos Aires, May 27–June 9, 1942.
- Systems of economic and financial control, Washington, June 30–July 10, 1942.
- Agriculture, 2nd, Mexico City, July 6–16, 1942.
- Sanitary, 11th, Rio, Sept. 7–18, 1942.
- Social Security, 1st, Santiago, Chile, Sept. 10–16, 1942.
- Municipal historical, 1st, Havana, Oct. 23–28, 1942.
- Physical education, 1st, Rio, July 19–31, 1943.
- Ministers of Education, 1st, Panamá City, Sept. 27–Oct. 4, 1943.
- Geography and cartography, 1st, Washington, Sept. 29–Oct. 14, 1943.
- Demographic, 1st, Mexico City, Oct. 12–21, 1943.
- Radiology, 1st, Buenos Aires, Oct. 17–22, 1943.
- National directors of health, 5th, Washington, April 22–29, 1944.
- Commissions of inter-American development, 1st, New York City, May 9–18, 1944.
- Criminology, 1st, Santiago, Chile, May 29–June 3, 1944.
- Geography and cartography, 2nd, Rio, Aug. 15–Sept. 2, 1944.
- Tuberculosis, 6th, Havana, Jan. 15–21, 1945.
- Problems of war and peace, Mexico City, Feb. 21–March 8, 1945.

Agriculture, 3rd, Caracas, July 24-Aug. 8, 1945.
 Coffee, 4th, Mexico City, Sept. 1-14, 1945.
 Radio, 3rd, Rio, Sept. 3-27, 1945.
 Social service, 1st, Santiago, Chile, Sept. 9-16, 1945.
 Ophthalmology, 2nd, Montevideo, Nov. 1945.
 Statistical institute executive committee, Rio, Jan. 7-11, 1946.
 North American regional broadcasting, 2nd, Washington, Feb. 4-25, 1946.
 Childhood protection, Montevideo, March 14-16, 1946.
 American I.L.O., 3rd, Mexico City, April 1-16, 1946.
 Railway, 5th, Montevideo, April 5-12, 1946.
 Indian institute, governing board, Mexico City, April 22, 1946.
 Engineers, 2nd, Montevideo, April 1946.
 Insurance, 1st, New York City, May 14-17, 1946.
 Boy Scout, 1st, Bogotá, May 27-June 1, 1946.
 Copyright protection, Washington, June 1-22, 1946.
 Mexico-U.S. agricultural commission, Los Angeles, July 22-25, 1946.
 Social security, Mexico City, July 23-28, 1946.
 Caribbean archeologists, 1st, Copán, San Pedro Sula, Comayagua and Tegucigalpa, Honduras, Aug. 1-11, 1946.
 Geography and history, 4th, Caracas, Aug. 22-Sept. 1, 1946.
 Cartography, 3rd, Caracas, Aug. 22-Sept. 1, 1946.
 Caribbean regional air, Washington, Aug. 26-Sept. 13, 1946.
 Legal medicine, legal odontology and criminology, 1st, Havana, Sept. 2-8, 1946.
 Medical, 1st, Rio, Sept. 7-15, 1946.
 Sanitary engineering, 2nd, Caracas, Sept. 26-Oct. 2, 1946.
 Surgery, 3rd, Montevideo, Oct. 1-6, 1946.
 Physical education, 2nd, Mexico City, Oct. 1-15, 1946.
 Mining engineering and geology, 2nd, Rio, Oct. 2-14, 1946.
 Sports tournament, Mexico City, Oct. 7-12, 1946.
 Otorhinolaryngology and bronchoesophagology, 1st, Chicago, Oct. 17-19, 1946.
 Leprosy, 2nd, Rio, Oct. 19-31, 1946.
 Social security tech. comm., Washington, Oct. 30-Nov. 9, 1946.
 Radiological, 2nd, Havana, Nov. 17-22, 1946.
 Press, 4th, Bogotá, Nov. 24-Dec. 1, 1946.
 Commission of women, 5th, Washington, Dec. 2-12, 1946.

(R. H. FN.)

Pan-American Highway

See ROADS AND HIGHWAYS.

Pan American Organizations

See INTERNATIONAL ORGANIZATIONS.

Pan American Union

In 1937 the American republics were in the process of re-enforcing and consolidating their international organization in anticipation of the climactic world events that were already then shaping. The Seventh International Conference of American States, held at Montevideo in 1933, together with the Buenos Aires Peace conference in Dec. 1936 and the Eighth International conference at Lima in 1938, resulted in positive contributions in revitalizing the Pan American movement and in strengthening the whole system of international relations in the western hemisphere.

The collective work of the continent at these three meetings was supplemented by the actions and policies of individual governments. The beneficial effects of the good neighbour policy enunciated by President Franklin Delano Roosevelt in 1933 were already evident. The acceptance by the United States of the principle of "nonintervention in the internal or external affairs of other states"; the modification of the policy of recognition; the reinterpretation of the Monroe Doctrine, returning it to its original basic principles; the abrogation of the Platt amendment with Cuba; the negotiation of a new treaty with Panamá affecting the rights of the United States in the Canal Zone—all served to allay the feeling of suspicion and distrust which had developed in many sections of Latin America. The commercial agreements negotiated with

many of the Latin American countries, under the reciprocal trade agreements program of Secretary Cordell Hull, also contributed to a revival of the international trade and an improvement in the national economies of the respective countries.

Pending questions between different American republics also were settled during this period. In 1938, a treaty of peace between Bolivia and Paraguay brought a definite end to the Chaco War; in the same year a serious controversy between the Dominican Republic and Haiti arising out of certain border incidents that had occurred during the previous year was settled through the application of the procedure of conciliation provided for in the inter-American peace treaties; and in 1942 the boundary between Ecuador and Peru was defined by the terms of the Protocol of Peace, Friendship and Boundaries signed at Rio de Janeiro.

As a result of these multilateral and bilateral measures the relations between the American republics were placed on a more satisfactory basis than they had been for many years. The position of the Pan American Union, official international organization maintained by the 21 American republics to promote closer relations among them, was greatly strengthened. The inter-American system was well equipped to meet the problems created by the outbreak of war in Sept. 1939.

Pan American Union and the War.—At the conferences of Buenos Aires and Lima, the American republics had developed the procedure of consultation whereby, in order to meet any situation that might threaten the peace of the western hemisphere, they would consult together at meetings of their ministers of foreign affairs. The Pan American Union was made the permanent secretariat of these meetings, which it served in the same manner as it had previously served the international conferences of American states.

Immediately following the outbreak of World War II in Europe, the governing board of the Pan American union convened the first meeting of consultation of the ministers of foreign affairs, which met at Panamá from Sept. 23 to Oct. 3, 1939. Two other meetings were called as the international situation developed and the shadow of war drew nearer to the American continent: the second at Havana, Cuba, July 21-30, 1940 and, following the attack on Pearl Harbor, the third at Rio de Janeiro Jan. 15-28, 1942.

To strengthen the military, political and economic defenses of the hemisphere the governing board of the Pan American union organized a number of special agencies, in accordance with recommendations of the meetings of foreign ministers.

Financial and Economic Advisory Committee.—Pursuant to a resolution adopted at the Panama meeting of foreign ministers, the Inter-American Financial and Economic Advisory committee was established at the Pan American union on Nov. 15, 1939. The resolution setting up the committee emphasized the necessity of close co-operation among the American republics to "protect their economic and financial structure, maintain their fiscal equilibrium, safeguard the stability of their currencies, promote and expand their industries, intensify their agriculture and develop their commerce."

The committee, consisting of representatives of the 21 governments, recommended concrete measures to mobilize the economic resources of the hemisphere and to implement the measures of economic control proposed in resolutions of the meetings of foreign ministers. Several special conferences were organized by the committee, one on mari-

time transportation in 1940 and another on economic and financial controls in 1942, both of which met at the Pan American union.

The committee also put into operation a plan whereby vessels that had sought refuge in ports of the American republics at the outbreak of the war were taken over and utilized in inter-American commerce. By this measure, German, Italian, French and Dutch vessels were placed in operation at a time when the need for shipping was greatest. With the conclusion of hostilities the plan was terminated, and each government was left free to make such arrangements as it saw fit with respect to the vessels it had taken over.

Offshoots of the committee were the Inter-American Coffee board, which was set up in 1940 to administer a plan for the marketing of coffee, and the Inter-American Development commission to promote the establishment of new industries in the countries of Latin America.

At the Inter-American Conference on Problems of War and Peace held at Mexico City in March 1945, the Financial and Economic Advisory committee was made permanent under the name of Inter-American Economic and Social council. The council began to function at the Pan American union on Nov. 15, 1945 and, like its predecessor, was composed of 21 members representing the governments of the American republics. It was empowered to co-ordinate all official inter-American economic and social activities; promote social progress and a higher standard of living for all the peoples of America; undertake research and make recommendations to the governments through the Pan American union on economic and social questions.

Inter-American Juridical Committee.—In accordance with a resolution of the Panamá meeting of foreign ministers, the Pan American union in 1939 established the Inter-American Neutrality committee, made up of representatives appointed by the governments of Argentina, Brazil, Chile, Costa Rica, Mexico, the United States and Venezuela.

The committee began to function at Rio de Janeiro on Jan. 15, 1940, and formulated recommendations on matters relating to internment, use of vessels as auxiliary transports of warships, the entry of submarines into the ports and territorial waters of the American republics, a security zone, the inviolability of postal correspondence, telecommunications, and the treatment of the crews of merchant ships suspected of sabotage. The committee also undertook the preparation of a draft convention on neutrality.

Following the entry of the American republics into the war, the name of the Neutrality committee was changed to Inter-American Juridical committee. It was charged with the study of juridical problems created for the American republics by the war, and was also entrusted with duties in the field of codification of international law.

The committee prepared projects and reports on numerous legal subjects, including the juridical status of "war criminals," the recognition of *de facto* governments, the international rights and duties of man, the fundamental principles of international law and a project of an inter-American peace system.

In 1945, the governing board of the Pan American union increased the membership of the committee to ten members, to enable it to carry on more effectively the duties entrusted to it, especially in the preparation of projects for the Ninth International Conference of American States.

Emergency Advisory Committee for Political Defense.—For the purpose of defending the American republics against espionage, sabotage and subversive propaganda, the

governing board of the Pan American union in 1942 set up the Emergency Advisory Committee for Political Defense, pursuant to a recommendation of the Rio de Janeiro meeting of foreign ministers. The committee had its headquarters in Montevideo, where it began to function on April 15, 1942. It consisted of seven members appointed originally by the governments of Argentina, Brazil, Chile, Mexico, the United States, Uruguay and Venezuela. Following the withdrawal in 1943 of the member designated by Argentina, the government of Peru was requested to name a delegate to fill the vacancy.

The establishment of the Emergency Advisory committee constituted an innovation in the organization of international bodies. In formulating the regulations of the committee the governing board of the Pan American union stipulated that its members "shall represent and shall function on behalf of all the governments, members of the Pan American Union." Although appointed by individual governments, the members acted not merely for the governments by which they were appointed, but for the entire community of American states. This was the first instance in the inter-American movement wherein the principle of collective representation was applied to a body of limited membership.

The committee submitted to the governments a series of recommendations of the measures that should be taken to curb subversive activities and to control or eliminate organizations harmful to the security of the American republics. National committees of political defense were set up in the different countries, and regional meetings were held to consider the problems of political defense peculiar to the respective areas.

Inter-American Defense Board.—In the military field, the Inter-American Defense board was established at Washington and held its opening session at the Pan American union on March 15, 1942. It was composed of military, naval and aviation experts appointed by each government, and was entrusted with a study of measures necessary for the defense of the continent.

At the Inter-American Conference on Problems of War and Peace it was agreed that the defense board should continue to function as an agency of inter-American defense until a permanent body is established.

Semi-Centennial.—The year 1940 marked the 50th anniversary of the Pan-American movement and of the founding of the Pan American union at the International Conference of American States held at Washington in 1890. The growth of the Pan American union during that 50-year period reflected in a sense the development of the inter-American system. Organized originally as a commercial bureau charged with the compilation of trade statistics and customs laws and regulations, the scope of the organization was enlarged at successive conferences to include many other activities. In 1902 the Columbus Memorial library was established, and in later years divisions were organized to function in the fields of intellectual co-operation, agriculture and tourist travel.

In 1937 the juridical division was set up to serve as the administrative secretariat of inter-American agencies engaged in the codification of international law, as a depository for the instruments of ratification of Pan-American treaties and conventions, and to undertake studies in the field of jurisprudence.

The division of labour and social information was established in 1940 to compile and disseminate information on all matters relating to developments in the social and la-

bour fields. In that same year a philatelic section was organized to make available to collectors postage stamps of the countries which were members of the Pan American union. In 1941, a division of music was organized to coordinate inter-American efforts in this branch of culture.

In addition to the emergency duties entrusted to it as a result of the war, the Pan American union during the decade 1937-46 continued to carry on the activities for which it was primarily organized. The administrative and technical divisions set up during this period as well as those previously established, continued to make studies in their respective fields and to issue reports which were made available to the member governments as well as to individuals and organizations interested in the American republics.

In 1942, the governing board of the Pan American union approved the provisional organization of an inter-American Institute of Agricultural Sciences, the purposes of which were to encourage and advance the development of agricultural sciences in the American republics through research, teaching and extension activities in agriculture and related arts and sciences. The definitive organization of the institute was provided for in a convention drawn up and opened for signature at the Pan American union on Jan. 15, 1944. Headquarters of the institute were located at Turrialba, Costa Rica. The members of the governing board constituted the board of directors of the institute and appointed its director and secretary.

Postwar Organization.—One of the important resolutions adopted at the Inter-American Conference on Problems of War and Peace at Mexico City in March 1945, was that on the reorganization, consolidation and strengthening of the inter-American system. Many of the provisions of that resolution related to and affected the organization of the Pan American union.

During the first 50 years of its existence the Pan American union did not exercise political authority, and by terms of the resolution adopted in 1928 at the Sixth International Conference of American States it was specifically precluded from undertaking political functions. At the Mexico City conference, however, the powers of the governing board were broadened, and it was authorized to take action "on every matter that affects the effective functioning of the inter-American system and the solidarity and general welfare of the American republics."

The Mexico City resolution also made provision for the appointment of special ambassadors to serve on the governing board. Since the Havana conference of 1928, the member governments could be represented on the board by such representatives as they might wish to appoint, but the practice had always been followed of designating the diplomatic representatives in Washington and the secretary of state of the United States. The Mexico City resolution sought to make the appointment of special representatives obligatory. Several governments, however, objected to the mandatory character of this provision and, following an inquiry directed to the governments by the governing board, it was agreed that governments so desiring might continue to be represented by their diplomatic representatives at Washington or the person they might wish to designate, until the Ninth International Conference of American States was able to give further consideration to the matter. Notwithstanding this modification of the specific terms of the Mexico City resolution, a number of governments appointed special ambassadors to represent them on the board.

The resolution adopted at Mexico City also prohibited any member from serving successive terms as chairman. At one time the secretary of state of the United States was *ex officio* chairman of the board and, although the Fifth International Conference of American States in 1923 provided for annual elections, the representative of the United States had always been elected to the office. On Dec. 5, 1945, in accordance with the Mexico City resolution, the board elected as its first Latin American chairman, the ambassador of Brazil, Dr. Carlos Martins. On his retirement as a member of the board, Dr. Martins was succeeded by the ambassador of Nicaragua, Dr. Guillermo Sevilla Sacasa, and on Nov. 6, 1946, the special ambassador of Colombia, Dr. Antonio Rocha, was elected chairman.

With the organization of the United Nations, the Pan American union also had occasion to consider the question of the relations between the regional and the world organization. The fundamental principles governing these relations were set forth in the charter of the United Nations. On the specific subject of the relations between specialized inter-American organizations and world organizations, the governing board of the Pan American union on Nov. 6, 1946 approved three principles which, it was proposed, should be incorporated in one of the projects on the organization of the inter-American system to be presented to the Ninth International Conference of American States. These principles were as follows: (1) that specialized organizations functioning within the inter-American system should establish the closest co-operative relations with similar world organizations; (2) that specialized inter-American organizations on entering into agreements with international organizations of a world-wide character should maintain their identity and position as an integral part of the inter-American system; and (3) that the governing board should intervene whenever it might deem it necessary in the negotiation of any agreement between specialized inter-American organizations and similar organizations of the world system, in order to preserve unity in the co-ordination of efforts and activities as among those organizations. (See also INTERNATIONAL CONFERENCES, ALLIED [WORLD WAR II]; PAN-AMERICAN CONFERENCES, 1937-46.) (L. S. Ro.)

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Pan-Slavism

Various movements for a closer union among the peoples speaking a Slavic language and supposedly of common racial descent were known in the 19th century under the name of Pan-Slavism. In these movements Russia, as the most powerful of the Slav nations, assumed a leading role. In its more aggressive forms, Pan-Slavism became a vehicle of Russian imperial expansion, often proclaimed as the task of liberating the Slav peoples of the Habsburg and Ottoman empires from German or Turkish domination. Before World War I, Pan-Slavism played only a small role in the official policy of Russia. It was largely a movement sponsored by intellectuals who generally regarded the Slav peoples as bearers of a distinct and significant civilization which they believed was characterized by a unique love for peace and by an exalted mission for the pacification and rightful ordering of mankind. The fact that Russia itself oppressed the second and third most populous Slavic nations, the Ukrainians and the Poles, to a degree

hardly equalled by the treatment of Slav peoples in other empires, proved an obstacle to the gospel of Pan-Slavism proclaimed by Russians. Polish intellectuals developed a Pan-Slavism of their own in which they demanded the union of the smaller Slav nations against Russian oppression and against the alleged danger involved in Russian expansion for European civilization.

Some of the Russian writers in the second half of the 19th century foresaw the formation of a Slav bloc under Russian leadership which would include in addition to the Slav peoples themselves, Rumania, Hungary, Greece, Constantinople and parts of Turkey. After the bolshevist revolution, the soviet government, however, rejected all forms of Pan-Slavism. It saw in them a reactionary and imperialist movement. In the then prevailing emphasis on internationalism and on class solidarity, a union based on common racial descent, on ties of blood or on an affinity of language, was unthinkable. Nobody then would have predicted the revival and intensification of Pan-Slavism two decades later and the realization of some of its most far-reaching aspirations.

Soon after the German attack upon soviet Russia in June 1941, a Pan-Slav committee was founded in Moscow which in frequent proclamations summoned all Slavs to fight against the Germans and stressed the racial and cultural community of the Slavs as opposed to Germanism. This new trend had for the first time been officially foreshadowed when Vyacheslav Molotov, the soviet foreign minister, declared on Sept. 17, 1939, at the time that the soviet armies invaded eastern Poland that the soviet government could not remain indifferent to the fate "of our kindred Ukrainians and White Russians inhabiting Poland." Here the international class ideology was replaced, or rather supplemented, by a doctrine of racial brotherhood and solidarity. The soviet press at that time reported the resolutions passed in thousands of spontaneous mass meetings throughout the soviet union declaring that "our sacred duty is to rescue our oppressed brothers." The same justification of racial and national kinship was adduced by the soviet government for the annexation of Czechoslovakia's Carpatho-Ukraine on June 29, 1945.

As the war between Germany and the U.S.S.R. progressed, the emphasis on Pan-Slavism grew not only for the purpose of winning the war but more and more for that of establishing and maintaining a peace according to soviet Russia's plans and intentions through the close integration of all the Slav nations. The Moscow Pan-Slav committee began the publication of a monthly *Slavyane* (The Slavs) in Jan. 1943. Repeating the ideology of early Pan-Slav and Slavophile thinkers, the Slavs were proclaimed as by nature inclined to and predestined for leadership in an ideal peace and constructive internationalism. The Communist parties in the various Slav nations after the victorious conclusion of the war, in Yugoslavia, Poland, Czechoslovakia and Bulgaria, became the foremost supporters and propagandists of this new Pan-Slavism under the leadership of the U.S.S.R., the mother country of communism and the oldest and most powerful among the brotherly Slav nations.

For the first time, people of Slav race or descent living outside the Slav countries and being citizens of non-Slav nations—especially Slav immigrants into the U.S., Canada, Latin America and other centres of Slav immigration—were organized for support of, and loyalty to the Slav motherlands united in the Pan-Slav movement under communist inspiration. Such a Slav congress was created in the U.S., where there were many citizens of Slav, especially Yugoslav and Polish descent. An article in *Slavyane* (Aug.-Sept. 1946) put the number of Americans of Slav descent

at 15,000,000. The chairman of the U.S. Slav congress was Leo Krzycki, a labour leader of Polish descent. Similar committees were active in Latin American countries, especially in Argentina. A Pan-Slav regional congress for the middle east met on July 20 in Jerusalem, Palestine. Slav committees were created in Belgrade, Yugoslavia, Warsaw, Poland, Prague, Czechoslovakia, and Sofia, Bulgaria, in co-operation with the Pan-Slav committee in Moscow whose chairman was Lt. Gen. Alexander Gundorov.

The preparatory committee to call the first postwar Pan-Slav congress met in July 1946 in Belgrade and decided to convene the congress on Dec. 8, 1946, in Belgrade. In the centre of the congress agenda were placed lectures and discussions on "the Slav nations in the struggle for peace and democracy" and on "contributions of the Slav nations to world culture." Each of the five Slav states (the U.S.S.R., Poland, Czechoslovakia, Yugoslavia and Bulgaria) was represented by 20 delegates. It was interesting to note that the soviet union, which contained many non-Slav nationalities and had always refused to be regarded as a national or racial state, was represented as a unit, while two Slav nations within the soviet union, the Ukrainians and the Byelorussians, were not represented separately, though the soviet union claimed and received for them special representation in the United Nations, in addition to that of the U.S.S.R.

On Dec. 8, 1946, Marshal Tito opened the Pan-Slav congress in Belgrade. The Yugoslav capital was chosen as the permanent seat of the Pan-Slav committee, consisting of one delegate from each of the five countries. Lt. Gen. Gundorov stressed that "Slav organizations together with progressive international organizations should wage an untiring struggle against the remnants of Fascism and war mongers. They should fight against spreading lies against the soviet union and Slav countries, and they should spread true information concerning them." He appealed especially to the "Slav progressive immigrants" in the U.S. and other countries to fulfill these tasks.

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Pantothenic Acid

See CHEMISTRY.

Papandreou, George

Papandreou (1888–), Greek politician, was educated at the Universities of Berlin and Athens and was governor general of the Aegean Islands, 1916–20. He became leader of the Radical Socialist party in 1935, opposed the Metaxas dictatorship and fled Greece after the German invasion in 1941. He then went to Cairo, where he became premier, April 1944, of the Greek government-in-exile. His regime had full endorsement from Prime Minister Winston Churchill.

Papandreou's authority was strengthened by the presence of six representatives of the Ethnikon Apeletherotikon Metopon (or E.A.M.), the strong leftist resistance organization, in his cabinet. However, his order of Nov. 8, 1944, calling for dissolution and disarming of the leftist resistance groups, led to the resignation of the E.A.M. representatives from his government. As the armed rightist groups were far outnumbered by the E.A.M., Papandreou called on British armies in Greece for support. Angered, the Ellenikos Laïkos Apeletherotikos Stratos (or E.L.A.S.,

the military arm of the E.A.M.) resisted the efforts made to disarm them and civil war broke out in Athens, Dec. 5, 1944. Churchill charged the E.A.M. was attempting to impose a "communist dictatorship" in Greece. E.A.M. leaders retorted that Papandreou was striving to set up a "one-man dictatorship" on the Metaxas model. Unable to cope with the crisis, Papandreou resigned as premier, Dec. 31, 1944.

Papen, Franz von

Von Papen (1879–), German statesman and diplomat, was born Oct. 29, 1879, in Werl, Germany, the son of a wealthy Westphalian landowner. He attended military schools, entered the army at the age of 19 and was promoted to a captaincy in 1913. The following year (1914), he was appointed military attaché in the German embassy in Washington, where, with Capt. Carl von Boy-Ed, the German naval attaché, he directed espionage and sabotage activities. In 1915, the United States demanded their immediate recall. Von Papen rejoined the army, serving on the Somme and later in Palestine as chief of staff of the 4th Turkish army. He resigned from the army after the Armistice and entered politics, becoming a member of the Prussian diet.

After Heinrich Brüning became chancellor in March 1930, Von Papen plotted to unseat him. His intrigues bore fruit in 1932, when Paul von Hindenburg, with whom he enjoyed friendly relations, was "persuaded" to oust Brüning and name Von Papen chancellor. However, Von Papen could not secure adequate support in the reichstag, and on Dec. 2, 1932, Kurt von Schleicher became chancellor.

On Jan. 4, 1933, Von Papen arranged for Adolf Hitler to meet German industrialists, who contributed 4,000,000 marks to the Nazi treasury. Reinforced by Nazi support, Von Papen then persuaded Hindenburg to dismiss Von Schleicher. On Jan. 30, 1933, Hitler formed the first Nazi cabinet, and Von Papen was named vice-chancellor. Hitler, however, grew dissatisfied with Von Papen, who in turn resented Nazi failure to consult with the conservative element in the government. Von Papen's irritation over the situation was climaxed in his Marburg speech in June 1934 in which he denounced the Nazi attempts to suppress the free press and the church. Enraged, Hitler ordered the arrest of Von Papen and his office force; two of his associates were murdered.

Von Papen was released July 3, 1934, and notwithstanding the murder of his associates, accepted the position of "special envoy" to "restore friendly relations" with Austria. He aided and abetted Austrian Nazis, and arranged the Schuschnigg-Hitler conference, Feb. 12, 1938, in Berchtesgaden. On March 10, 1938, the day before Hitler ordered the occupation of Austria, he recalled Von Papen to Berlin.

Thereafter, Von Papen retired to private life until April 1939, when he accepted the ambassadorship to Turkey. He remained there until 1944 when Ankara broke off relations with the axis. Shortly afterward, Von Papen returned to Berlin.

Toward the close of the war, he was taken prisoner by U.S. 9th army troops in the Ruhr (April 10, 1945) and was indicted by the International Military Tribunal at Nuremberg as a war criminal. While the court deplored Von Papen's offenses against political morality, it stressed such actions were not covered by the charter and stated there was no evidence showing that Von Papen had been

a party to planning aggressive war. Consequently, he was acquitted, Oct. 1, 1946.

Paper and Pulp Industry

The paper industry is an ancient one, dating back to the year 100 when a Chinese craftsman demonstrated that paper could be made from fibres from the inner bark of the mulberry tree and from old fish nets. This art was passed down through the centuries until, about 1800, a machine was invented to make paper in a continuous web. Textile fibres were the principal raw material used until the 1880s, when the fibres from wood were found suitable and several chemical and mechanical processes were invented to separate the fibres from their binding encrustants. The invention of movable type printing in the early 1800s provided a great stimulus for the use of paper as a printing medium. With the establishment of the wood pulping processes and the paper machine the production of paper grew steadily with increases in population and expanded usages through the years.

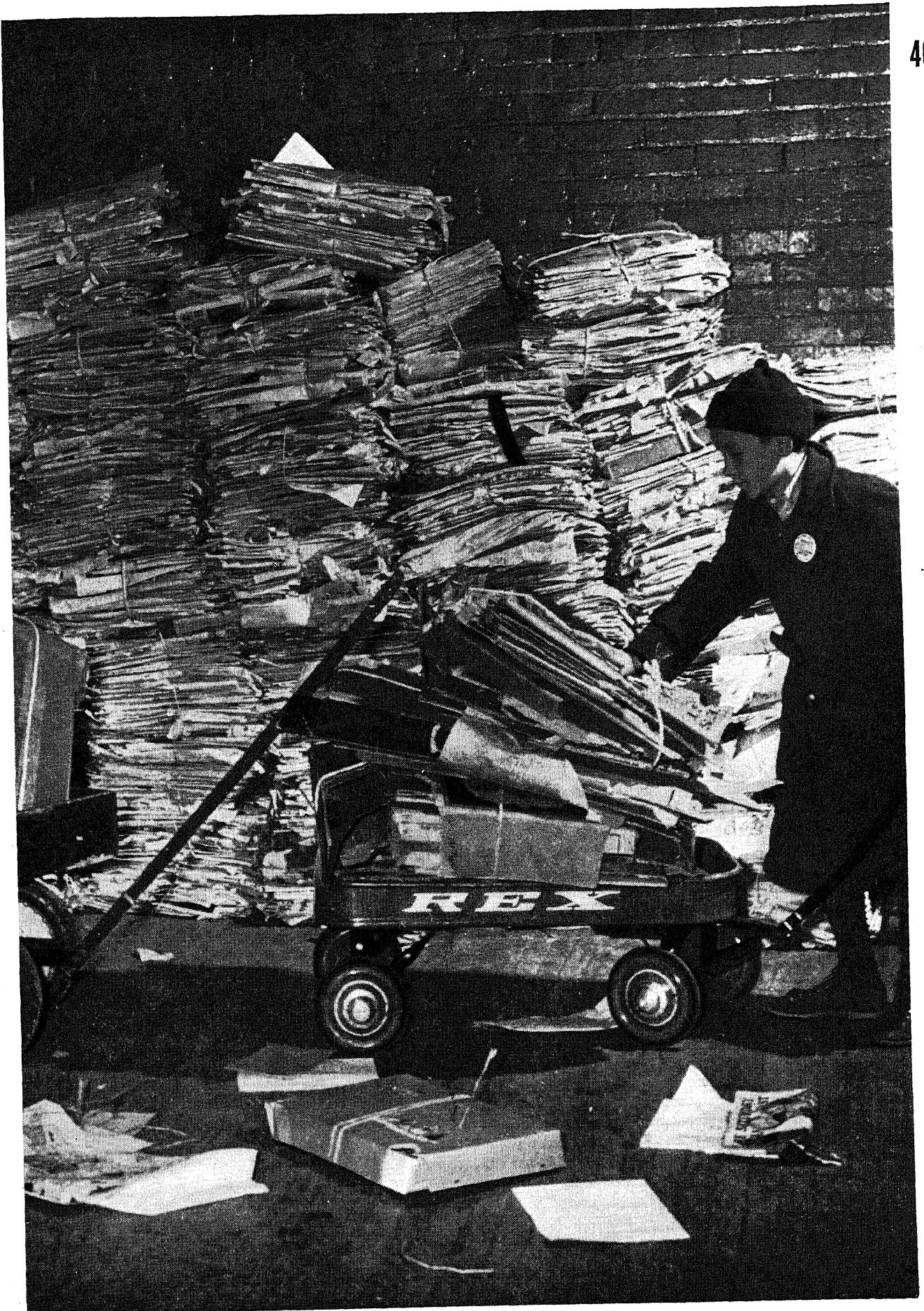
United States.—The decade 1937–46 was abnormal in many respects. In the years just prior to World War II, the U.S. paper industry was emerging from a depression, and the war years presented an entirely different aspect, one of unprecedented general demand, and a new particular demand for new types of papers to act as substitutes for container materials such as metal foils, rubber, glass and sheet metals.

During this decade, improvements in the United States resulted in higher qualities of product and lower prices for the consumer to pay. At the same time employment increased, and although the industry produced more paper per employee by 1939 than it did in 1929, the increasing total production overcame the technological unemployment which usually follows such a development. By the end of the 1930s the industry employed 7% more wage earners than it did in 1929. Moreover, workers in the industry were able to buy with their wages 13% more goods and services than they could in 1929. These comparisons relating to the more normal years just before the war reflected the vitality of a growing and healthy industry even when faced with the expected handicap of a depressed economy.

The outbreak of World War II brought an unprecedented demand for newsprint, bookpaper, wrapping, special industrial papers, multiwall shipping sacks, paperboard shipping and inner containers and many other items. The rise was accelerated after the attack on Pearl Harbor, and paper, normally one of the cheapest and commonest of materials, eventually became one of the most scarce in relation to demand.

Although the war caused wood pulp imports from Scandinavia to drop sharply and finally to disappear, increased U.S. production and importation from Canada raised the total U.S. wood pulp supply from 9,000,000 tons in 1939 to 12,000,000 tons in 1942. At the same time, paper and paperboard production rose from 13,500,000 tons to more than 17,000,000 tons with the aid of wastepaper drives, which brought in 6,000,000 tons annually in 1941 and 1942. When Scandinavian imports were cut off it became necessary for the government to institute many controls such as allocating the existing supplies of wood pulp to all paper mills, whether manufacturers of wood pulp or not, and establishing a priority status for all grades of paper and

U.S. school children participated in the national wastepaper salvage campaigns which helped meet the wartime paper shortage



paperboard on the basis of their relative importance to the war effort. By use of such controls nearly all mills were able to participate in production.

Victory in Europe was opportune. It brought an immediate and sizable reduction in the use of wood pulp for nitration purposes and it promised some relief through importation of pulp from Sweden. Many control orders were revoked, and since the war did not require the physical conversion of the pulp and paper industry, reconversion did not pose any serious problems.

During the war, inventories of pulpwood, wood pulp, paper and paperboard were greatly depleted and needed to be built up. The widespread substitution of paper and paperboard products for steel, tin, lumber and other scarce materials in the early stage of the war opened new markets for these products, many of which were retained. Striking advances were made in paper use during the war, particularly in waterproof packaging materials. There was reason to anticipate postwar consumption of printing materials at record-breaking levels.

An over-all picture of the U.S. paper and paperboard industry during the decade is shown in Table I:

Table I.—U. S. Paper Industry, 1937–46
(Tons of 2,000 lbs.)

	Production	Imports	Exports	Consumption	
				Tons	Lb./capita
1937	12,837,003	3,435,222	232,361	16,039,864	248.2
1939	13,509,642	2,702,953	266,079	15,946,515	243.4
1941	17,762,365	3,120,213	494,911	20,387,667	308.9
1943	17,035,688	2,762,429	347,864	19,450,253	286.8
1944	17,182,804	2,616,000	344,000	19,454,804	286.1
1945	17,370,965	2,754,880	458,634	19,667,211	281.7
1946 (est.)	18,620,000	3,100,000	475,000	21,245,000	302.7

The capital investment in the United States industry in 1946 was \$2,900,000,000 in 926 units in 38 states. Fifty-eight per cent of the industry was in localities of under 10,000 population.

Canada.—The four great sources of Canadian wealth are forests, farms, minerals and water power. Of the peacetime manufacturing industries, pulp and paper had stood first in employment, first in total wages paid, first in export values, first in net value of production and first in capital invested. The capital invested in the pulp and paper industry in Canada at the outbreak of World War II was more than double that of the next largest manufacturing industry in the dominion.

In newsprint paper alone, Canada had a mill capacity of over 4,250,000 tons a year, 4 times greater than any other country. About 94% of the newsprint output was exported. In the production of wood pulp, Canada was second only to the United States.

Excluding the war years, fluctuations in national income closely paralleled pulp and paper production. The industry became the largest individual buyer of goods and services in Canada. In 1944 the industry's purchases exceeded \$174,000,000 and included \$70,500,000 for transportation, \$21,600,000 for fuel, \$15,700,000 for electricity, \$34,600,000 for chemicals and mill supplies, \$6,600,000 for fibres and fibre stocks, \$19,000,000 for pulpwood and \$8,000,000 for food and fodder connected with operations.

The sums paid to workers ran to an estimated \$180,000,000 annually. Mill workers received \$75,000,000 and workers in the woods an estimated \$75,000,000. In 1946 there were about 82 pulp and paper companies in Canada, operating 108 mills in six provinces. In addition to pulp and newsprint, the companies had a highly-developed production of fine papers, wrapping paper, tissues, paperboard and other cellulose products.

The effects of the depression of the 1930s on the

Canadian paper industry had been devastating. The newsprint manufacturers were particularly hard hit. At one time 60% or more of this part of the industry was in default of its bond interest. By 1935 the social consequences of the disruption in the industry had become so distressing that the governments of Quebec and Ontario, where 80% of the newsprint capacity was located, adopted a joint policy of prorating orders among the mills in order to spread employment and to avoid the closing of any mills. Whole towns and their surrounding regions depended for their livelihood on the operations of these mills.

Demand began to improve in 1935, and by 1939 the industry had an annual capacity of 4,003,000 tons of groundwood pulp, 2,101,000 tons of chemical pulp and 4,546,000 tons of paper. During the earlier years of World War II, the manufacture of wood pulp and paper increased substantially. In 1940 and again in 1941, production exceeded all previous levels in both volume and value. In 1942, 1943 and 1944 the gross value increased still more, but the volume of pulp and paper produced was somewhat lower than in 1941.

Two factors accounted for this decrease in production; first, the urgent need for more men for war industries and the armed services reduced the supply of manpower for cutting pulpwood; and second, the production of munitions and war material necessitated the diversion to war plants of part of the hydroelectric power used in pulp and paper manufacture.

The wartime record of the industry was outstanding. During the six war years the industry provided Canada with more than \$1,250,000,000 (U.S.) and helped to obviate the need for lend-lease arrangements between the dominion and the United States. Forty countries relied chiefly on Canada for their wartime newsprint supply. For the Latin-American countries as a whole Canada supplied about 80% of their imports.

Both at home and abroad, Canadian pulp went in vast quantities into the manufacture of nitrocellulose for explosives and to make rayon for parachutes, self-sealing gasoline tanks and other war products. In one year alone Canadian paperboard boxes carried some 4,500,000 tons of goods from farm to factory to battlefronts and to consumers at home. They saved weight and space aboard ship and 2,000,000,000 ft. of lumber for other urgent war needs. In addition to making paper, the industry put 83 machine shops on a full war service basis, turned hundreds of untrained men into skilled workers and made gun mounts, winches, steering devices and many other essential items for the building and repair of ships.

Total production of all kinds of paper in Canada was as follows: 1937, 4,345,361 tons (2,000 lb.); 1939, 3,600,502 tons; 1941, 4,524,776 tons; 1943, 3,966,344 tons; 1944, 4,044,376 tons.

With the change-over of many mills in the United States from newsprint to other grades, particularly machine-coated groundwood book papers, the Canadian industry seemed likely to enhance its position as world supplier of this commodity. In 1939 the Canadian newsprint industry was far ahead of all others, as shown in Table II.

Table II.—World Production of Newsprint
(1939, in short tons)

Canada	2,869,000	Sweden	305,000
United States	939,000	Norway	226,000
British Isles	848,000	U.S.S.R.	200,000
Germany	415,000	Holland	104,000
France	276,000	Other, Europe	256,000
Finland	519,000	All others	12,000
Japan	437,000		
Newfoundland	308,000	Total	7,714,000

Great Britain.—From the time Queen Anne granted a ten-year monopoly to the British Company of White Papermakers in 1690, Britain has had an active papermaking industry. Britain first developed the Fourdrinier and cylinder papermaking machines and made many other contributions to the art of papermaking. After the defeat of Napoleon, Britain became the world's greatest international trader and banker. Being the leading papermaking nation, it also became the world's greatest exporting nation with respect to paper.

British dominance of the export field was challenged by Sweden, Norway, Finland and Germany when wood became the primary raw material. But Britain answered the challenge by the use of northern European wood pulp and with wood purchased from these and other European sources. The result was that at the beginning of World War II Britain was still one of the most important paper exporting nations, exceeded only by Canada, Sweden, Finland, Germany, Norway and the United States. In 1938 the United States slightly exceeded Britain's prewar exports but in 1941 the United States shipments were more than double those of 1938, while exports of Great Britain, reflecting wartime shipping difficulties, were reduced to one-third those of the 1935-1938 average.

Table III.—British Paper Industry
(In thousands of short tons)

	Production	Imports	Exports	Consumption
Ave. 1935-38.	2,645	1,251	200	3,705
1939	n.a.	1,129	156	n.a.
1940	2,305	678	148	2,565
1941	1,557	194	72	1,679
1942	1,441	146	37	1,550
1943	1,299	143	28	1,414

War damage to the British paper industry apparently was not extensive, and with wood pulp supplies moving in from Sweden and North America during the postwar period, the situation was much improved.

Scandinavia.—The Scandinavian countries and Finland are essentially producers of wood pulp for export purposes. During World War II production was restricted largely to local needs for cattle fodder, paper and chemical products. Limited shipments were permitted to be made to neutral countries.

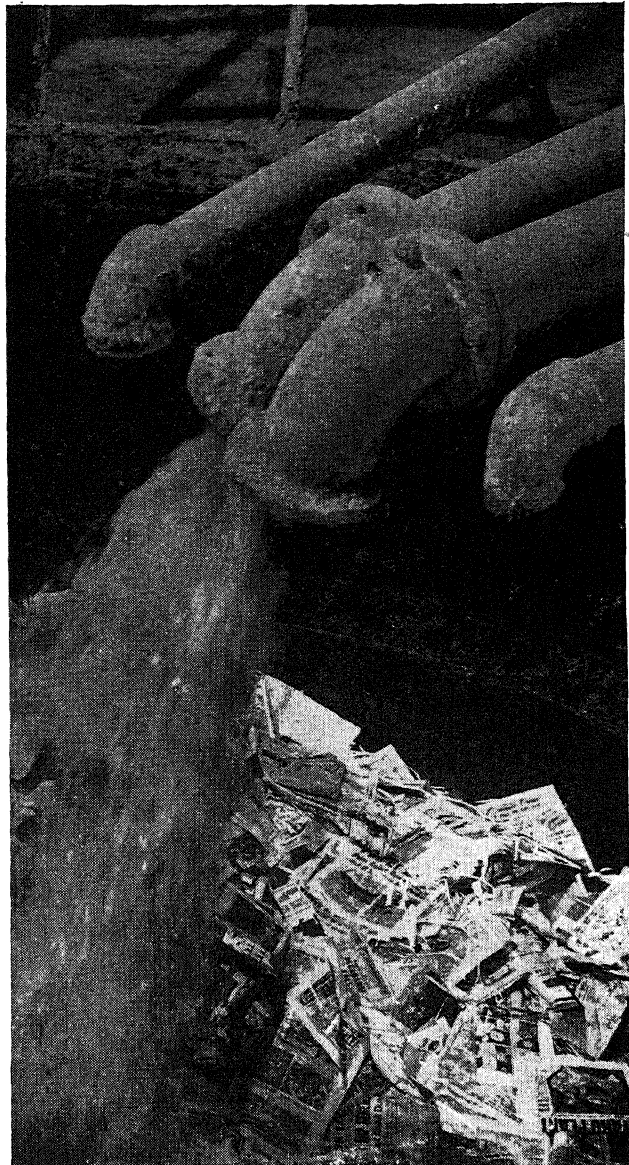
Table IV.—Swedish Production and Export of Wood Pulp
(1935-39, short tons)

	Production	Exports
1935	3,278,446	2,318,048
1936	3,505,870	2,512,758
1937	3,883,901	2,813,616
1938	3,373,693	2,183,114
1939	3,456,975	2,569,775

It will be seen that 1937 was the peak year in production and exports. These exports were shipped to 41 countries, but 83% went to six countries as follows: United States 1,084,634; Great Britain 650,242; France 271,057; Japan 123,068; Germany 107,188; Italy 106,785.

The Swedish pulp mills were believed to have ample supplies of pulpwood cut and in their stock piles at the end of the war. A definite shortage of coal was reported, however, and firewood was being used to a considerable extent in the boilers. It was likely that Sweden would exchange much of its wood pulp with Britain for much-needed coal.

Finland and Norway operated their mills during World War II, but no statistics were available covering this period. In 1945, 505,495 metric tons of wood pulp were produced for export. Of this, the United States had contracted for 126,180 metric tons. The soviet union, however, cancelled restitution payments so that no further shipments of pulp could be made under that category. In 1945 Finland produced 207,634 metric tons of sulphite



Wastepaper, mainly salvaged by U.S. householders, being churned into pulp in macerating vat during 1944. The pulp was later rolled into paperboard

pulp, 156,381 of sulphate pulp and 307,377 of groundwood. The groundwood industry was severely handicapped by lack of power caused mainly by the loss of two large power stations in the ceded territory.

In Norway the pulpwood supply problem was the greatest single difficulty facing the industry in the postwar period. Occupation by the German forces had nearly destroyed the pulpwood-gathering facilities of the industry.

The capacity, however, was about the same as before the war. Expressed in metric tons this was 1,524,000, including all kinds of pulp. The mills were expected to operate in 1946 at about 35% of capacity. (See also CHEMURGY.) (R. G. M.)

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Papua

See NEW GUINEA.

468 Paraguay

Paraguay, a landlocked republic in south-central South America, is bounded on the north and east by Brazil, on the south by Argentina and on the west by Bolivia. Its latitude centre is the 25th parallel, and its east-and-west extension from the 55th to the 60th meridians of longitude. Area 149,807 sq.mi., of which 61,004 lie east of the Paraguay river and are well-settled, while 88,803 lie west of the river and are sparsely inhabited. Access is mainly by the Paraguay-Paraná river system (966 mi. Buenos Aires to Asunción), although a railway also gives connection with eastern Argentina. Capital, Asunción, population (est. Dec. 1943) 126,280 (Greater Asunción 186,875). Other cities: Villarica 30,176, Concepción 16,007, Encarnación 15,610. Official language: Spanish. The Guaraní tongue has survived more than the blood, but is secondary and recessive. Official religion: Roman Catholicism; all religions are tolerated. Official estimates of population: 1938, 954,848; 1943, 1,108,040. The latter estimate showed 1,056,139 in eastern Paraguay, and 51,901 in western Paraguay—the Chaco. The Spanish strain predominates in the bulk of the population, with varying minor proportions of Guaraní; and the Italian strain is substantial. Many farm colonies were founded by groups from other nations, but most of them, except those of German-Brazilian and German-Mennonite stock, had been dissipated in 1946. The presidents of Paraguay during the decade 1937–46 were as follows: Col. Rafael Franco (Feb. 17, 1936–Aug. 15, 1937); Dr. Félix Paiva (Aug. 16, 1937–Aug. 14, 1939); Gen. José F. Estigarribia (Aug. 15, 1939–Sept. 7, 1940); Gen. Higinio Morínigo (after Sept. 8, 1940).

Aftereffects of the Chaco War.—When Paraguay was attacked by Bolivia in the Chaco War in 1932 the country's defense had been inadequately prepared. The entire manpower of the country was mobilized and found itself without proper equipment. During the three years of hardship and struggle there arose among the officers, both temporary and professional, a desire to modify the manner of government; but there was no unanimity as to a new pattern. After the armistice of June 1935 which ended hostilities the economic and financial condition of the nation had very badly deteriorated. An Association of Ex-Combatants was formed, numbering more than 100,000 members. Socialist and Communist organizers were active and effective and a quasi-fascist movement arose among the younger educated class.

The leading army officers had been particularly disturbed by the moderate policy pursued by the Ayala government at the Chaco peace conference at Buenos Aires—a policy which they regarded as showing the traditional Liberal amenability to Argentine influence and as conceding too many of the fruits of Paraguay's victory. In Jan. 1936 Eusebio Ayala had agreed to permit a neutral military commission to enforce an agreement against further military activities in the Chaco and further increases of troops or arms. General elections were to be held in March, and leaders of the Colorado party led certain army officers to believe that the Liberals would use their power to ensure their return to office. In Feb. 1936 the government had dismissed and exiled Col. Rafael Franco, who had zealously been preaching reforms in the military school which he commanded. The garrison regiments at Campo Grande, on the outskirts of Asunción, led by Cols. Federico Smith and Camilo Recalde, marched on the capital, seized the government and brought back Col. Franco

to be chief of state, on Feb. 17, 1936.

The Franco Dictatorship.—Franco accepted his mandate, in a public statement, as coming from the Paraguayan army, a new departure which was to be followed with variations several times in the decade 1937–1946. It is to be noted that the army and the male population were at that time imbued with a feeling of mutual fellowship—a situation which tended to disappear in the next few years.

It was at once apparent that Col. Franco, albeit a high-minded idealist, wished to institute a fascist state. He forbade all political activity, imprisoned or exiled the leaders of the former pseudo-democratic government and curbed the press. He brought back to Asunción and enshrined in the national pantheon the body of the dictator Francisco Solano López, whose disastrous war in the 1860s had been adversely regarded; and he gave notice of Paraguay's withdrawal from the League of Nations. He undertook to form a single National Revolutionary party, on the Italian and German style. In the direction of national socialism he established price and wage control boards favouring the workers, provided for collective bargaining and the eight-hour day, created a national bank, founded agricultural schools, a "people's university" and units for combating endemic diseases. He raised the taxes on wealth and industry, and threatened to socialize several of the large enterprises. Conspicuous were his measures toward breaking up the great *estancias* to create small farms.

The party-line Communist agitators and their Socialist fellow-travellers, who were infiltrating the common soldiers and were in control of the Workers' federation, wished these reforms to be carried out not by authoritarianism but by a workers' republic on the Russian order; they so greatly antagonized both Franco and the army officers that several of their leaders were forcibly exiled. Franco subsequently tried to regain leftist support by cabinet changes, with little success, and his National Revolutionary party fell apart. Meanwhile he was losing both army and Colorado support by failing continually, despite repeated promises, to call national elections.

In order to secure formal recognition for his government by other nations Col. Franco had been forced to recognize the Chaco agreements signed by his predecessor, and this was disliked by the army officers. While his delegates to the peace conference adopted an intransigent tone at Buenos Aires, they finally agreed with his approval of a plan for resuming diplomatic relations with Bolivia, based on the payment by the latter of a heavy indemnity to Paraguay for prisoner upkeep and on the withdrawal of Paraguayan troops from the Villa Montes road in the Bolivian oilfields. The army would have none of this plan and, after Bolivia had paid its indemnity, still refused to surrender the road. On this issue, and on its desire that elections be called, an officer group led by Col. Ramón Paredes forced Franco's resignation in mid-August 1937, permitting him and his aides to depart from the country.

Interim Government.—The army now installed Dr. Félix Paiva as president, despite his genuine unwillingness. Dean of the law faculty and a former Liberal vice-president, he had never descended to practical politics and was respected. On taking office he announced that elections would promptly be held, and that while the workers and small farmers would be safeguarded, he would also protect property and industrial interests and would permit the return to Paraguay of former President Ayala and other Liberals. Rendered hostile by these declarations, the leftists, who had failed to follow Franco when he was in power, decided to reinvest him with the presidency, and staged a strong revolt on Sept. 7, 1937, which was put down by the

army with considerable difficulty. Paiva was compelled to proclaim martial law, and appointed as minister of interior Col. Arturo Bray, an army strong man. He proceeded with his plans for elections by naming an electoral commission on Oct. 25; but the adherents of Franco claimed that they were not properly represented and resorted to another subversive attempt, again crushed. A few weeks later in December, when martial law was lifted, the Franquistas made their third abortive revolt.

Sustained by the army leaders and Col. Bray, Paiva moved steadily toward the renewal of democratic government. In Feb. 1938 he issued a call for congressional elections to be held in September. He also welcomed back to Paraguay Gen. José Félix Estigarribia, who had been the modest and brilliant commander-in-chief of the forces in the Chaco War. The people joined enthusiastically in the welcome, and Gen. Estigarribia was given the important post of minister to the United States. A few weeks later the political parties were permitted to reorganize and resume campaign activities. The Liberals chose as their leader and future presidential candidate Dr. Jeronimo Zubizarreta, who had been Paiva's representative at the Chaco peace conference and whose recalcitrant attitude in that capacity had been widely admired. When the Chaco peace treaty was signed in July 1938 (see below), Paiva submitted it to the people in a plebiscite, a democratic procedure; and in September the congressional elections were held as promised.

Unfortunately the Colorado party, which had boycotted all elections since 1931 on the ground that they were dominated by the Liberals, pursued this policy once again, and the Franquistas took no definite position; so that the new congress was almost wholly Liberal. It wisely decided to maintain Paiva as provisional president pending regular presidential elections in the spring of 1939 and the inauguration of the successful candidate at the regular time in the following midsummer. With martial law continuing to be intermittently necessary, the government lowered taxes on enterprise, resumed partial payments on the debt and appealed for Leftist approval by consolidating much of Franco's labour legislation. By Feb. 1939 it was able to dispense with Col. Bray and permit freedom of the press; and the Liberals, who had turned away from Zubizarreta on the peace treaty, nominated Gen. Estigarribia for the presidency. The other parties did not wholly abstain from voting when the elections were held on April 30, 1939, but Estigarribia was chosen by a two-thirds' majority.

Chaco Peace Treaty.—Early in 1938 the neutral mediators at Buenos Aires had made a special attempt under the auspices of the retiring President of Argentina, Gen. Agustín Justo, to bring about an agreement on peace by sending missions to Asunción and La Paz. The two belligerents had remained refractory to the proposals, but views were secured which permitted the drafting of another formula in May. The adherence of Bolivia's representative was given to this compromise; but Paraguay's Zubizarreta was still obdurate, and his counter-proposal was found inequitable by the mediators and Bolivia. By late June it appeared that an impasse had been reached after three years of negotiations. Both contestants began rearming, frontier clashes occurred and the resumption of war seemed not improbable.

At this juncture came the spectacular and unexpectedly efficacious personal intervention of Gen. Estigarribia, who flew from Washington to Buenos Aires and was quickly able by his tact and persuasiveness to change the attitude of the Paraguayan delegation, notwithstanding Zubizarreta's resistance. Whatever his instigation may have been,

he secured the drafting of a new treaty which was initialed by both delegations on July 9, 1938. It was accepted by their respective home governments on July 17, and was at last signed formally on July 21, 1938. The boundary was to be fixed by a commission of neutral arbitrators on a line somewhere within the zone to which the dispute had narrowed down. The mediators at Buenos Aires were asked to arbitrate, and on Oct. 10 issued an award which fixed the frontiers permanently. It gave Paraguay most of the territory she had occupied, including four-fifths of the Chaco; but left to Bolivia her oilfields under exploitation and gave her a port on the upper Paraguay river together with transit rights at the Paraguayan Puerto Casado.

The relations between Paraguay and Bolivia were renewed by an exchange of ministers in November. Little use was made by Bolivia of the access to the river which had been so greatly desired, the distances being great both from the river to eastern Bolivia and from the ocean to the fluvial ports. Rail construction into Bolivia to the north of Paraguay was undertaken by Brazil and to the west of Paraguay by Argentina, so that the likelihood of friction between the two countries was greatly lessened. The Bolivian oil deposits did not as yet show great promise. There was some possibility, however, that oil might be found in the Paraguayan Chaco, where the Union Oil Company of California conducted active explorations under a contract signed with Paraguay late in 1944.

Estigarribia's Presidency.—The president-elect, chosen not only as the hero of the war but the negotiator of the peace, was able to procure economic aid at Washington from the Export-Import bank before returning. A German agent had come to Paraguay in April 1939 and offered loans for an economic program embracing the long-sought highway to Brazil and a chain of tobacco factories, guaranteed by a state monopoly on petroleum products. In June the need for acceptance was obviated by credits arranged by Estigarribia with the United States, with \$3,000,000 for the road and a water system at Asunción, and \$500,000 for stabilizing the currency. On his homeward journey the general also secured Brazilian pledges for a branch bank and a railway into northern Paraguay, together with Argentine pledges for river dredging, boundary adjustments and an Argentine branch bank at Asunción.

After Estigarribia's inauguration on Aug. 15, 1939, it soon became clear that army support would be no less indispensable for the new president than for his predecessors. He left aside the elder Liberals, who would have preferred Zubizarreta and who were disliked by both the Colorados and the Franquistas. As the two latter groups were non-co-operative, he sought out new talent, mainly rather youthful, for his cabinet; and he chose a new army leader, Gen. Nicolas Delgado. With a program of moderate reforms he coupled efforts to induce the Colorados to take part in choosing a new Congress which should be less one-sidedly Liberal. By autumn, however, he was under fire from a new direction, as there had arisen a group of intellectuals who were disciples of the philosophy of Premier Antonio de Oliveira Salazar of Portugal. Headed by Dr. Luís A. Argaña, they founded the newspaper *El Tiempo*, and early in 1940 staged a prolonged students' strike. Just when the Colorados were on the verge of pledging participation in elections, a law passed by the government to cope with the Tiempistas restricted the freedom of the press and of assembly and caused the Colorados to break with Estigarribia. Factional chaos was again rampant, and on Feb. 18, 1940, the cabinet resigned and was reorganized, while



Pres. Higinio Morínigo of Paraguay addressing the U.S. house of representatives in 1943, at which time he reaffirmed his country's pledge to keep her international commitments. Morínigo was re-elected for a six-year term in Feb. of that year. Speaker Sam Rayburn is seated at the rostrum

the congress voted to dissolve itself and leave the president free to prepare a new constitution on democratic lines.

Assuming dictatorial powers with army backing, Estigarribia pledged a new form of government based on, corporative and economic collaboration by all classes. He named a commission of jurists, headed by former President Cecilio Baez, to draft a substitute for the constitution of 1870, and assisted in its labours for four months. By early July the new charter was completed and submitted to a plebiscitary vote, and on Aug. 15, 1940, it was formally proclaimed. It provided secret and compulsory voting, and guaranteed not only the civic freedoms and the rights of labour but also land ownership by every citizen. At the same time it conferred upon the president sweeping emergency powers to be used at his discretion, and in lieu of a senate it established a corporative council representing various economic, professional and religious elements along the lines of fascist models. In view of Estigarribia's undoubted devotion to the cause of the democracies this instrument did not occasion criticism abroad, and it seemed calculated to preserve order in faction-ridden Paraguay. The hopes for the future of the nation were abruptly dashed, however, by the tragic accidental death of the president on Sept. 7, 1940, in a plane crash.

Morínigo in Power.—The persistent determination of the army to ensure stability was brought into play by the prompt resurgence of ambitious manoeuvres on the part of the political chieftains of both parties, as well as of the Communists and Franquistas. In the belief that none of the groups would co-operate with any other, or could give good government if in power alone, the officers imposed upon the cabinet, with the approval of the supreme court, the designation of Higinio Morínigo as chief of state.

During the Chaco War and subsequently as Estigarribia's minister of defense, he had shown a talent for keeping the armed forces fairly well united; and he shared

their feeling that an enforced political truce was needed for economic and social tranquility.

He announced the continuation of Estigarribia's program, but within a month was forced to dispense with the former inexperienced brain-trust cabinet; and Col. Paredes issued a statement that the army was guaranteeing Paraguay's government.

Just before his death, Estigarribia had asked the United States for extensive additional economic aid, and the country was convinced that this was forthcoming and was highly important. Morínigo was thus faced with the problem of persuading Washington that he would follow his predecessor's policies while at the same time using non-democratic means to stay in power (as Estigarribia would probably have been forced to do). He chose as his first minister of foreign affairs Dr. Tomas Salamoni, known as a collaborator with the democracies; and he sent to President Franklin Delano Roosevelt, in the hands of a pro-U.S. minister, Dr. Juan José Soler, a holographic letter pledging support in hemispheric defense. Late in November, to show that his government was not that of any special officer-group, he replaced Col. Paredes by Col. Sosa Valdes. At the same time, to assure a modicum of civilian support, he brought the Tiempo Catholic Action group into his cabinet, and to do so he gave the foreign ministership to its leader, Dr. Luís A. Argaña. The U.S. government, while willing to believe provisionally in the pro-Ally intentions of Morínigo and Argaña, limited its assistance for the time being to continuing the instalments on the credits already granted, and offering a further \$900,000 for a mandioca-starch industry and river port works. This relative success by the new regime somewhat encouraged the numer-

ous revolts engineered by the politicians and Communists during the early months of 1941; but Morinigo was able always to rally sufficient strength among the officers so that his domination of the situation was gradually confirmed.

The impression that the Paraguayan government, because of its military and non-democratic character, was disposed to favour the axis cause was fostered by its Paraguayan opponents, mostly voluntary exiles, in other capitals; and the Argentine government sought to influence Paraguay against adhesion to the United Nations. The French military mission at Asunción, under Vichy impulsion, propagated defeatist sentiment among the army officers; and the large German and Italian elements in the population, as well as the German and Italian legations, lent their support to Morinigo in the expectation that his policy would be pro-totalitarian.

On the other hand, the president himself took pains to point out that the powers he had assumed were merely those contemplated by the Estigarribia constitution; and he resorted to no executions and few imprisonments. He became diplomatically convinced of the danger which an axis victory would bring to the independence of small nations such as Paraguay, and also of the probability that in a war of matériel the western powers would eventually win. The earnestly religious Tiempistas found Adolf Hitler's paganism and barbarous methods repugnant. Thus it came about that at the end of 1941 the Pearl Harbor attack revealed the Morinigo regime to be staunchly pro-Ally. When the Rio de Janeiro conference was convoked, the Argentine government invited Foreign Minister Argaña to Buenos Aires and made remarkable efforts to secure his attachment; but at the conference he was foremost in announcing the rupture of relations by his government with the axis.

The implementation of the Rio de Janeiro policies was extremely difficult in Paraguay, where the German and Italian residents were numerous, useful and orderly. The economic and political pressure of Argentina was potent and unrelenting, while the army was disposed to authoritarianism and impregnated with Vichy propaganda. Nevertheless, Morinigo and Argaña, moving cautiously and adroitly, were able by June 1942 to arrange the expulsion of the axis diplomats, and sent into diplomatic exile the pro-

Vichy minister of the interior. They also permitted, and insofar as practicable abetted, the functioning of the U.S. and British black-listing operations, although this dislocated the predominantly Argentine and German commerce and industry of the country. The recommendations of the hemispheric Political Defense committee were accepted in principle, and Paraguay never became a centre for transmitting axis information. In 1944, some of the leading German-Paraguayan organizers were interned. The construction of a U.S.-financed airfield was sanctioned in 1942, and although interrupted by an unruly army unit was duly completed by the end of 1943. In the series of hemispheric conferences throughout the war, Paraguay unwaveringly sustained the Brazilian and U.S. points of view. This had its significance not only because of her strategic geographic location on the frontiers between pro-Ally Brazil and pro-axis Argentina but also because of her traditional military prowess and the notable reputation of her fighting forces in combat. Paraguay received very substan-

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate		1 gold peso = 68.6 cents (2s. 9½d.)		1 gold peso = 60.8 cents		1 guarani =* 33 cents
Finance						
Government revenues . .	\$3,919 (\$802)				\$6,667 (\$1,652)	
Government expenditures .	\$4,766 (\$975)	"			\$8,252 (\$2,045)	
National debt	\$22,590 (\$4,621)				\$21,294 (\$5,277)	
Transportation						
Railroads		700 mi.				750 mi.†
Highways		3,759 mi.				4,122 " †
Waterways (Paraguay river)		1,800 "				1,800 " †
Communication						
Telephones		3,133		3,800		
Telegraph lines		3,844 mi.		2,385 mi.		
Radio sets		6,000		14,500†		
Crops						
Manioc		533,939 tons		1,129 tons‡		
Balata		113,810 "		"		
Corn		76,331 "		131,276 " †		
Cotton (raw)		45,393 "		28,792 " †		
Quebracho (extract) . .		38,847 "		50,962 " †		
Sugar cane (sugar content).		8,400 "		476,334 " †		
Livestock						
Cattle		3,750,000§		3,507,000||		4,030,000‡
Sheep		140,000§		195,260		220,000‡
Horses		125,000§		205,500		214,000‡
Forest products						
Quebracho (extract) . .		40,605 tons				
(exports only)						
Manufacturing						
Beverage		95,104 gal.				
Chemicals		{1,111,358 gals. 38,968 tons}				
Exports						
Total	\$8,251 (\$1,688)	...	\$10,077 (\$2,499)	...		
Cotton (ginned)	\$2,192 (\$448)	10,060 tons	\$1,052 (\$261)	5,692 tons		
Quebracho (extract) . .	\$1,518 (\$310)	40,606 "	\$1,933 (\$479)	41,083 "		
Hides	\$1,222 (\$250)	354,843	\$1,767 (\$438)	434,138		
Meat extracts	\$1,191 (\$244)	2,315 tons	\$192 (\$48)	470 tons		
Imports						
Total	\$9,008 (\$1,843)	...	\$8,105 (\$2,010)	...		
Cotton textiles	\$1,267 (\$259)	1,768 tons	\$888 (\$220)	1,123 tons		
Wheat and wheat flour . .	\$1,164 (\$238)	33,935	\$804 (\$199)	37,950 "		
Automobiles and accessories	\$402 (\$82)	...	\$153 (\$38)	...		
Defense						
Standing army personnel .		12,170		6,000||		
Reserves		87,934		80,000||		
Standing air force personnel		170		170||		
Military expenditures . .	\$1,265 (\$259)		...			
Education						
Public schools		997§				
Enrolment		133,287§				
Private schools		129§				
Enrolment		6,179§				
Normal schools		8§				
Universities		1§				

*New unit of currency replaced peso on Nov. 7, 1943. †1943. ‡1942. §1937. ||1940.

472 tial lend-lease military and naval equipment from the United States.

Later Governmental Adjustments.—The participation of the Tiempistas in the Morínigo government weakened the Franquista opposition, as many Franquistas had views parallel to those of the Argaña group. Morínigo was willing to give the Colorados a share in the cabinet, but they would accept nothing less than complete control, and when this was refused they had insufficient strength in the army to upset the regime. The younger Liberals were pro-Ally, like Morínigo; and the elder Liberals, mildly pro-Argentine, showed no large popular support. Therefore the numerous conspiracies and attempts against the government during 1942 were never effective. The left wing of the Franquistas, under Communist leadership, did succeed in converting the volatile student sentiment, formerly pro-Argaña, to an alliance with the workers; and the strikes of the students and labourers constituted Morínigo's greatest problem. The army backed him in a policy of firmness, and after the U.S.S.R. became a co-belligerent with the Allies the Communists made somewhat less trouble.

In Feb. 1943 the presidential elections which Morínigo had promised were duly held, and since no political activity was permitted and no candidate named except the general himself, he emerged with a well-nigh unanimous and apparently fairly heavy popular vote. Prior to his inauguration he made a series of state visits to other American countries in May and June. He was received with great cordiality in Brazil; and at Washington he addressed the U.S. congress and laid the basis for a trade agreement. Other countries which welcomed him were Mexico, Panama, Venezuela, Colombia, Ecuador, Peru, Chile and Bolivia. When he was inaugurated on Aug. 15, 1943 for a five-year term, some 24 nations sent delegations in recognition of his continuance as a chief of state; and these delegations were able to note the quality of his armed forces.

After the success of the reputedly Argentine-instigated Villarroel revolution in Bolivia late in 1943, the Paraguayan Liberals in turn made a resolute revolt in Feb. 1944, but a sufficient proportion of the army officers remained loyal to Morínigo so that it was put down. The recognition of the Villarroel government in April by the Allied governments, however, was taken by Dr. Argaña as indicating that a strong policy toward Argentina would not be followed by the democracies; and as he had incurred the hostility of Argentina he felt it best to resign from the cabinet, taking his Tiempo colleagues with him, to leave Morínigo less subject to antagonism from President Edelmiro Farrell at Buenos Aires. Two or three non-political civilians were brought into the cabinet, but they were uncomfortable under army repression and in June 1945 their leader resigned because the army was monopolizing the national revenues.

When Juan D. Perón's election in Argentina in the spring of 1946 was followed by *rapprochement* with Brazil and the United States, Morínigo renewed negotiations toward a customs union with his southern neighbour. Desirous of evolving away from military government, he at length took the bold step of dismissing the strong anti-democratic officer clique led by Col. Benítez Vera, and was able to quell the ensuing rebellion by the latter in June 1946. After the Bolivian revolution which deposed Gualberto Villarroel in July, Morínigo announced that, in conformity with the hemispheric trend away from absolutism, his government was again permitting political activity in Paraguay. As the return of ex-President José Patricio Gug-

giari to Asunción brought unexpectedly vigorous Liberal manifestations, however, the political freedoms were once more curtailed, and Guggiari departed. Col. Franco, who had likewise returned, remained in Paraguay. President Morínigo's military and cabinet appointments were of a nature to confirm his intention to reinstitute popular government and to co-operate with the great democratic nations.

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Parents and Teachers, National Congress of

See SOCIETIES AND ASSOCIATIONS.

Paris

Capital and largest city of France, Paris had a population, according to the census of 1936, of 2,829,746 (2,891,020 in 1931). Many of the people of Paris continued to live, however, in the industrial and residential suburbs of Greater Paris, which formed the department of the Seine with an area of 185 sq.mi. and a pop. of 4,962,967 in 1936. The Parisian population overflowed also into the departments of Seine-et-Marne and Seine-et-Oise. Paris itself was divided into 20 arrondissements, each one with a mayor at its head. The municipal council of Paris, composed of 90 members, has no elected mayor, his place being taken by the prefect of the Seine and partly by the prefect of police.

Paris had been for many centuries not only the administrative and cultural centre of France but one of the great capitals of the world, equally renowned for the beauty of its monuments, the wealth of its literary life, and its pre-eminent position in the fields of painting and sculpture. The 19th century also saw the rapid growth of an important industrial region in a belt of factory towns surround-

German cavalry riding past the Arc de Triomphe, under which the tomb of the unknown French soldier of 1914-18 lies, as they entered Paris on June 14, 1940



ing the ancient city. The ten eventful years 1937-46 did not pass Paris by. Though only negligible war damage was done to the city and to its artistic treasures and historical monuments, the great upheaval in the world left deep scars in the moral and economic texture of the French capital. The fall of Paris in 1940 was due as much to the internal dissensions in France as to the strength of the Germans. In the postwar period, it was a painful effort for Parisians to regain their former position.

The decade 1937-46 found Paris in the near stage of a latent civil war between "left" and "right." The political and intellectual concentration of French life in the capital made Paris the foremost battleground of the conflicting national and international trends and ideologies of the fateful decade. In Feb. 1934, fascist sympathizers had arranged great demonstrations on the Place de la Concorde opposite the Palais Bourbon, seat of the chamber of deputies, the symbol of the democratic parliamentary institutions of the Third Republic. The disorders led to a reassertion of the democratic elements which formed a common front with the Communists, called Front Populaire, and assumed the government of France as a result of the parliamentary elections in 1936. The new government under the leadership of the veteran Socialist M. Léon Blum, carried through some of the much delayed social reforms in the interest of the French working class. The workers' unrest expressed itself in a wave of strikes which hampered French production at a time when the critical international situation demanded a thorough modernization of French military and economic forces. Nor was the French general staff in any way up to the requirements of the time.

City of Light.—In spite of all the difficulties, the efforts to improve and beautify Paris continued up to the beginning of World War II. Some congested, badly built and unhealthy districts were torn down and replaced by new buildings surrounded by parks and squares. At the various gates of Paris, in particular, where the old fortifications were destroyed, new cities grew up, and light and air became available to those Parisians who had hitherto been congested in the narrow streets of the centre of the city. Organizations such as the Office Publique d'Habitation à Bon Marché de la Ville de Paris undertook the construction and development there of blocks of flats, and their social service system installed baths, dispensaries, sanatoria and children's clinics, with a medical service in regular attendance to examine, care for, and generally look after the children. To meet the need for new churches in these new centres of population, the "Chantiers du Cardinal," founded by the archbishop of Paris, opened 106 places of worship. All around the city the outer boulevards, which had become indispensable in order to draw off congestion from the very heavy traffic in the centre, were considerably widened and improved. New tunnels were made. The main arteries out of Paris, much too narrow, were also widened. Considerable works were undertaken, especially toward the west, in the direction of La Défense, Courbevoie and Saint-Cloud, where the first French autostrade was planned. The bridges were also widened.

The International exhibition of 1937, though retarded in its opening by strikes, bequeathed to Paris some permanent architectural improvements. The exhibition pavilions lined the two banks of the Seine below the Pont Alexandre III. The Pont d'Iéna was widened, and the old national warehouses on the Quay d'Orsay were demolished. The old Trocadéro palace opposite the Eiffel tower was replaced by a new modern building, the Palais de Chaillot. Nearby, two new magnificent palaces, one national and the other municipal, were kept as places of exhibition of

contemporary art. Under the terrace on the site of the old Trocadéro building on the right bank of the Seine, a new theatre was opened with seating capacity for 2,800. It was completed in 1939, in the same year as the vast new ministry of communications in the Avenue de Saxe et de Ségur, and the museum of the ministry of public works. The interior of the Opéra was renovated, and a new lighting system was installed.

Shadows and Blackout.—The international situation threw its shadows over the capital and increased the gloom which social and economic unrest produced. The days of Sept. 1938 brought the expectation of war home to the Parisian population, who only two months before had greeted King George VI and Queen Elizabeth with great celebrations. The Munich agreement, which seemed to promise a peaceful settlement of the international crisis, was almost unanimously hailed by the people of Paris, who felt a great relief at the thought of their city and land being spared the horrors of war. But by the beginning of 1939 the situation worsened again. Preparations for protection against air raids and for the evacuation of the city in case of war proceeded slowly. Steps were taken to safeguard the art treasures of Paris. When war broke out in Sept. 1939, nearly 2,000,000 people, including most of the school children, were evacuated from Paris and its suburbs. When, however, weeks passed without serious warfare on the western front and when Paris was not subjected to the dreaded air raids, people returned to Paris and looked with great confidence and assurance upon the "phony" war. The blackout was never as complete as in London, and was soon relieved by increased street and shop-window lighting. The spring of 1940 presented, under a mild and friendly sky, a Paris lovelier than ever, with most people hardly aware of the threatening catastrophe for which city and country were morally and materially little prepared.

When on May 10 the German armies struck in the west, the French rear rose as little to the needs of the hour as the French army. The latter's efforts to hold the line of the Somme and the Marne rivers collapsed and the German armies approached Paris; whereupon the capital was declared an open city and was surrendered without fighting. Under similar circumstances, in 1870, the city had been heroically defended for four long months against the overwhelming power of the besieging German armies, and it was only extreme starvation which finally forced surrender. This time, the city of light and the capital of liberal influences on the continent of Europe gave itself up without the slightest try at resistance to the invading enemy of liberal thought, who proclaimed his easy triumph as a symbol of the decadence and collapse of democracy before the onslaught of totalitarianism. Early on the morning of June 14 the German forces entered the city.

When a census of the population of Paris was taken on July 7, 1940, it amounted to only 1,051,046. When the German armies approached, the people of Paris, like those of other communities of France, started an unprecedented, unorganized, panicky flight in all kinds of vehicles and on foot which increased the demoralization of France and impeded whatever military plans could be made. The armistice which France signed on June 22, 1940, divided the nation into an occupied and an unoccupied territory. Paris formed one of the six zones of the occupied territory and ceased to be the capital of France. The new government was established at Vichy.

By the end of the year, many people had returned to



U.S. troops marching down the Champs Élysées after the liberation of Paris in 1944

Paris. The German occupation forces on the whole behaved with very good discipline, but Paris now began to suffer from considerable physical privations, shortages of food, fuel and transportation making themselves felt almost immediately. The Parisian subway or "metro" became the chief means of transportation in the city. The bicycle began to replace motor cars and buses. The theatres resumed their functions, and newspapers and books were widely published, but the whole cultural life was strictly co-ordinated with the totalitarian principles of the German government and ideology and was closely supervised. The Germans encouraged the French factories to continue production. They also supplied raw materials which were needed for industry, but requisitioned a very large part of the manufactured goods for themselves. In 1941, clothes, thread and shoes became extremely scarce. While many necessities were lacking, some luxuries abounded, and there were many instances of feverish speculation both in luxuries and in works of art. According to statistics, 60 theatres, 66 dance halls and night clubs and 175 motion picture houses were functioning in the summer of 1941.

The threat of unemployment was partly averted by French industry working for the Germans. The latter used the considerable surplus of the costs of the occupation imposed upon France to buy control of many leading French industrial and commercial establishments. The fact that much of French industry worked for German war needs caused the American and British air forces later on to stage some mass raids over Paris, concentrating how-

ever on the industrial suburbs and sparing the city itself.

The growing resistance movement which was inspired by the example and the appeals of General de Gaulle provoked severe reprisals on the part of the Germans. The German administrator of Paris, General Otto von Stuelpnagel, resorted to the shooting of French hostages for real or alleged attacks on German officers and soldiers. After Germany had attacked the soviet union in June 1941, the French Communist party and the workers under its influence had taken an active and often a leading part in the resistance movement. As the tide of war turned against Germany in 1943 with the Allied victories at El Alamein and Tunis and with the Russian victory at Stalingrad, the underground movement gained in strength.

With the beginning of 1944 Paris assumed more and more the aspect of a stricken city: extreme starvation was to be found side by side with the thriving black market; the unusual quiet of the streets, only rarely broken by the noise of German motor cars, added to the strange impression; under the surface patriotic heroism and extreme demoralization contrasted and sometimes even intermingled.

But the liberation of the city came faster than many had expected. When the invasion army of U.S. and British troops defeated the Germans in Normandy and Brittany and approached the French capital, the resistance forces with the help of the local police rose on Aug. 19, 1944. Negotiations with the German occupation authorities es-

established a truce which averted the possible destruction of parts of the city by German bombardment. Sporadic fighting lasted until Aug. 25, when the arrival of tanks from a division of General de Gaulle's Free French under the command of Brig. Gen. Jacques Philippe Leclerc turned the tide definitely in favour of the resistance forces. Paris had been under German occupation for more than four years. When it became again the capital of France and the citadel of the liberal tradition on the European continent, the moral wounds and the economic enfeeblement produced by the eventful years of the immediate past continued to stay with Paris. Only the outside beauty and serene loveliness of this unique city emerged unchanged.

Scars.—Paris became the seat of the provisional French government headed by General Charles de Gaulle, who for more than four years had represented the moral forces of France and had become the symbol of her true liberty. But the war was still going on; the liberation from German control did not provide any immediate relief from the cold and hunger from which so many people in Paris had suffered so long. The Germans continued to occupy the most important Atlantic ports. Other ports being destroyed, supplies from abroad could therefore come in only very slowly, and the destruction of bridges and the depletion of rolling stock made communication between Paris and the provinces very uncertain. New problems were created by the large U.S. and British forces stationed in Paris or spending part of their furloughs there. The official rate of exchange was fixed at 50 francs to the dollar but was lowered in Dec. 1945 to approximately 120 francs to the dollar. But even this rate did not represent the true buying power of the franc. A very lively black market in dollars and other foreign exchange developed. On this black market the franc was quoted in the second half of 1946 at 280–330 for the dollar.

Parisians cowering on the sidewalk in panic when collaborationist snipers, barricaded in buildings on the Place de l'Hôtel de Ville, opened fire on them during festivities marking the arrival of General de Gaulle after the city's liberation in Aug. 1944

Life in Paris contrasted sharply with that in London. While in the latter city living was uniformly austere and sufficient supplies were provided for everyone, Paris offered the picture of bleak starvation side by side with black market opulence and wartime profiteering. A severe shortage of coal continued to make the winter uncomfortable and hindered the resumption of full industrial production. By the middle of 1946 the food situation had improved considerably. Taxicabs reappeared on the streets in greater numbers; many hotels which had been taken over for French or Allied governmental military purposes were returned to their original purpose, and the strain on the transportation system was eased by the growing number of buses. Many restaurants were well provided with meat, though the prices remained exorbitant. Goods began to reappear in the shop windows, but by the end of 1946 life was still very far from normal.

With the liberation of France Paris became again the seat of the French parliamentary bodies. The several elections held in 1945 and 1946 did not succeed in endowing France with a stable government. The Communists and the (Catholic) Popular Republican movement emerged as the two strongest parties, followed by the Socialists and by the various groups of liberal republicans of whom the Radical Socialist party was the strongest. By the end of 1946 the veteran Socialist leader Léon Blum had formed a cabinet to guide the nation over its parliamentary crisis until an agreement among the various parties about the formation of a stable French administration could be achieved.

The leading figures of the Vichy regime were tried in Paris after Germany's defeat. During 1945 the former chief of state, Marshal Henri Philippe Pétain, the former prime minister, Pierre Laval, and the intellectual leader of the anti-democratic and anti-British intellectuals, Charles Maurras, were among the prominent Frenchmen who had to face the court. Pétain and Maurras, both very old men,



were to expiate their attitudes in prison for the rest of their lives; Laval was executed. Other trials followed, but by the end of 1946 this chapter of French internal strife was practically closed. Journalism, the theatres, literature and arts were cleansed of the collaborators with the Germans in their ranks.

In 1945 a woman member of the municipal council launched an anti-vice crusade and demanded the closing of the city's 178 legalized houses of prostitution, some of them large and important establishments of world-wide fame. Legislation was passed and by Oct. 1946 all the houses were closed, a step which provided a minor alleviation to the housing crisis which was as severe in Paris as it was in all large cities.

In 1946 Paris again resumed her rank as an international capital. The Council of Foreign Ministers and the delegates of 21 states met in Paris, in the Palais de Luxembourg, to draw up the peace treaties with Italy, Hungary, Bulgaria, Rumania and Finland. The representatives of these former axis nations were invited to meet with the representatives of the victors in Paris in the spring of 1947 to sign the peace treaties. But any comparison with Paris as the centre of the peace negotiations after World War I made it painfully clear how much Paris and France had suffered in loss of strength.

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Paris Exposition, 1937

See ARCHITECTURE; FAIRS, EXHIBITIONS, EXPOSITIONS.

Paris Peace Conference, 1946

See PEACE NEGOTIATIONS, WORLD WAR II.

Parity Farm Prices

See AGRICULTURE.

Parks and Monuments

See NATIONAL PARKS AND MONUMENTS, U.S.

Parliament, Houses of

History could not record more exacting years for parliament than the years 1937-46. Contemporary observers in the main agreed that parliamentary government had emerged strengthened from a period of extreme testing. Outstanding events were the abdication of King Edward VIII, the formation of the coalition government signifying unity of all parties for prosecution of World War II, and the advent, with an overwhelming majority, of a Socialist government. Perhaps the most significant feature dominating the whole political scene was that parliament remained omnipotent during the years of crisis and during the war met without interruption.

Before World War II.—On Nov. 3, 1936, King Edward VIII opened the second session of the 37th parliament. On Dec. 11 his majesty's Declaration of Abdication bill was passed through all its stages, and George VI was proclaimed king. A national government, predominantly Conservative with Stanley Baldwin as prime minister, was in power. The state of the parties in Jan. 1937 was 387 Conservatives, 33 Liberal Nationals, eight National Labour, two Nationals and one Independent (supporting the

government); 154 Labour party, 17 Liberals, four Independent Liberals, four Independent Labour party, four Independents and one Communist (in opposition).

The coronation of King George VI and Queen Elizabeth took place on May 12, 1937, in Westminster abbey with members of both houses present. The coronation was followed by the resignation of Baldwin, who was succeeded as prime minister by Neville Chamberlain. Legislation during the year included a Coal bill transferring coal royalties in private hands to the state and a Factories bill. A bill revising the scales of salaries for ministers acknowledged for the first time by legislation the office of leader of the opposition with a salary of £2,000 per annum attached thereto. The first indication of international upheaval came with the passing of an Air Raid Precautions bill.

The third session was opened by the king on Oct. 26, 1937. Parliamentary interest was focused on foreign affairs. In Feb. 1938 Anthony Eden, the foreign secretary, and Viscount Cranborne, under secretary, resigned after differences with Prime Minister Chamberlain over the procedure to be followed in Italian affairs. Eden was replaced by Viscount Halifax. The Eire Confirmation of Agreements bill which, among other matters, abrogated England's right to the occupation of the treaty ports, was passed without a division. As a result of pressure by back bench members a Holidays with Pay bill also became law. The house of commons was in recess when Chamberlain visited Adolf Hitler, first at Berchtesgaden and then at Godesberg. Parliament was recalled on Sept. 28, 1938, when war seemed imminent. The dramatic incident of a message inviting Chamberlain to Munich, which arrived during the course of a speech outlining events, produced an unprecedented scene of wild enthusiasm and emotion in which members of all parties joined. Sir John Anderson (Ind.) was appointed lord privy seal.

The king opened the fourth session of the 37th parliament on Nov. 8, 1938. The speech from the throne stated that the lord privy seal was charged with the organization of civil defense and the utilization of the resources of the nation for national voluntary service. The National Service act and Civil Defense bill were passed without opposition. On March 31, 1939, the prime minister announced a British guarantee to Poland in the event of aggression. This was followed by the Military Training bill, which for the first time in British history made provision for conscription in time of peace. Two new ministries were set up—the ministry of supply and the ministry of information—presided over by Leslie Burgin and Lord MacMillan respectively. In May the secretary of state for the colonies, Malcolm MacDonald, outlined the government's new proposals for Palestine which aimed at creating an independent Arab Jewish state in ten years. In Westminster hall, the French president, Albert Lebrun, and his wife were officially received by parliament. On Aug. 24 parliament passed in all its stages between 6:45 P.M. and 10:29 P.M. the Emergency Powers Defense bill. This bill, which gave the executive unlimited power to govern if need be by order in council, passed without a division. The safeguard for the people was its limited life and the need for fresh parliamentary sanction for its continuance. Prime Minister Chamberlain formed a war cabinet of nine persons which included Winston Churchill as first lord of the admiralty, and Lord Hankey.

Parliament in Wartime.—On Sept. 3, 1939, at noon, in the house of commons, Prime Minister Chamberlain announced that Great Britain was at war with Germany. On the same day four bills, including the National Services

(Armed Forces) bill, became law. On Sept. 5 the first bill relating to the organization of civilians was introduced. Three new ministries were established—economic warfare, food and shipping. Parliamentary business was solely concerned with matters affecting the prosecution of the war. Members of parliament were issued travel tickets for withdrawal to Stratford-on-Avon in the event that parliament could not continue to meet at Westminster.

The fifth session was opened by the king without the customary state ceremony on Nov. 28, 1939. In December the national expenditure committee consisting of 28 (subsequently 32) back bench members of all parties was set up. Its establishment was necessary, as for security reasons only token estimates were presented to parliament. The house of commons' jealously-guarded control of expenditure was adequately protected in the wide powers conferred on the expenditure committee. In April 1940 Chamberlain reconstructed his government. Leslie Hore Belisha, secretary of state for war, was replaced by Oliver Stanley. The ministry for co-ordination of defense was abolished. Lord Woolton became minister of food, Sir Andrew Duncan, president of the board of trade and Sir John Reith, minister of information. The war was going badly, and a vote of censure on the government was moved on May 8; 200 members, including many normal supporters of the government, voted for the vote of censure with 281 against. Chamberlain interpreted the vote as one of lack of confidence and in accordance with constitutional practice tendered his resignation to the king and advised him to send for Winston Churchill. The house met on May 13 with Churchill as prime minister; he had formed a coalition government.

The new war cabinet consisted of Winston Churchill as prime minister and minister of defense; Neville Chamberlain, lord president of the council; Clement R. Attlee, lord privy seal; Viscount Halifax, secretary of state for foreign affairs; Arthur Greenwood, minister without portfolio. Ernest Bevin, Herbert Morrison and Sir Archibald Sinclair were included in the government. The ministry of war transport was established and a petroleum department. By the end of the session Lord Beaverbrook as minister of aircraft production, Ernest Bevin as minister of labour and Sir Kingsley Wood as chancellor of the exchequer had joined the war cabinet. On the death of Chamberlain, Sir John Anderson became lord president of the council. Owing to damage to the house of commons, parliament for the first time was meeting at Church house, Westminster. Legislation passed by the coalition government included an extension of the original Emergency Powers Defense bill. It was passed in three hours and contained the most sweeping proposals ever placed before parliament in that it gave the government power to control persons and property in every way.

For the first time, parliament was opened by the king outside the precincts of the house of lords, at Church house on Nov. 21, 1940. The king's speech dealt only with the prosecution of the war. Viscount Halifax was appointed ambassador to Washington, and Anthony Eden became foreign secretary and a member of the war cabinet. By common agreement, election contests in constituencies ceased. The years 1940-41 brought the beginning of the manpower problem in an acute form. On March 20, 1941, the Registration of Employment order for women, with power of direction, was announced. The minister of labour appointed a women's advisory committee consisting of eight influential women to advise him regarding the registration and call-up of women. The house of commons chamber was destroyed in an air raid on May 10, but parliament continued to meet at Church house until later in the year,

when the house of commons resumed its sittings in the house of lords, and the lords met in the king's robing room, which had been converted for their use. Oliver Lyttelton was appointed minister of state in the middle east with a seat in the war cabinet. This session saw the first sign of an interest in the postwar years. In June it was announced that Sir William (later Lord) Beveridge had been requested to make a comprehensive survey of existing schemes of social insurance and allied services.

The seventh session was opened by the king on Nov. 12, 1941. During 1941-42, Sir Stafford Cripps became lord privy seal, leader of the house and a member of the war cabinet; Lord Beaverbrook and Arthur Greenwood both ceased to be members. Oliver Lyttelton became minister of production and was succeeded as minister of state by Richard Casey, who joined the war cabinet. Clement Attlee became secretary of state for the dominions. Additional ministries were established—the ministry of works and buildings (minister, Lord Portal) and the ministry of fuel and power (minister, Gwilym Lloyd George). In March 1942 Sir Stafford Cripps left on an important mission to India. Churchill described the cabinet proposals as "an attempt by a constructive contribution to aid India in the realization of full self-government." Sir Stafford failed to obtain agreement among the representatives of the Indian people on the suggestions put forward. In December the report by Sir William Beveridge was published.

The eighth session of the 37th parliament was opened by the king on Nov. 11, 1942. During the session Sir Stafford Cripps left the war cabinet and resigned his leadership of the house, becoming minister of aircraft production. His place in the war cabinet was taken by Herbert Morrison. Eden became leader of the house. Lord Woolton also joined the war cabinet as minister of reconstruction, an indication of the importance attached to postwar matters. A ministry of town and country planning was set up with William S. Morrison as minister. On March 3, 1942, the speaker, Captain E. A. Fitzroy, died and was succeeded by Colonel Douglas Clifton Brown. The victory in Africa, which signified the turning of the tide in favour of the Allies, was the occasion for congratulatory addresses to be moved in both houses on May 18. The favourable trend of the war was reflected in parliament by many debates on home affairs. The Catering Wages bill was introduced, proposals for the reform of the foreign service were approved and the Uthwatt, Scott and Barlow reports were all issued. An important debate took place on the Beveridge report.

On May 26 the question of the powers conferred on the executive for the war emergency was raised. Major Maurice Petherick (Conservative) initiated a debate on the following motion: "That this house admitting the necessity for war purposes of giving abnormal powers to the executive is of opinion that parliament should vigilantly maintain its ancient right and duty of examining legislation whether delegated or otherwise." This debate was negative, but subsequently a select committee was appointed to examine and report on procedure in connection with statutory rules and orders, and in Dec. 1944 the government announced the setting up of a sessional select committee to draw the attention of the house to any rules or orders with which it required the house to be acquainted. Thus did parliament insist on maintaining its traditional authority.

The ninth session was opened by the king on Nov. 24, 1943. Two new ministerial offices were instituted, primarily concerned with postwar reconstruction. Viscount Swin-

ton became minister for civil aviation and Sir William Jowitt minister for national insurance. The war cabinet lost one member when R. C. Casey was appointed governor of Bengal. A comprehensive new Education act reached the statute book. In May 1944, the government published a White Paper on its full employment policy. Lord Portal resigned his appointment as minister of works in order that his successor, Duncan Sandys, might be in the commons. With the relieving of the war emergency, by-elections began to be contested by members of splinter parties with marked success. A select committee under the chairmanship of Earl Winterton was set up to plan the rebuilding of the house of commons.

The Postwar Period.—The tenth session of the 37th parliament was opened with the usual wartime ceremony, on Nov. 29, 1944. The surrender of Germany was announced on May 8, 1945, and parliament immediately attended service at St. Margaret's, Westminster, and subsequently loyal addresses were presented to their majesties in the royal gallery. The fall of the coalition government was brought about by the resignation of Labour ministers and Liberal ministers who followed Sir Archibald Sinclair. Churchill resigned as prime minister on May 23 and became head of the "caretaker government" on May 29. On June 15 parliament was dissolved by the king. The state of the parties at the time of dissolution was: Conservatives 361, Liberal Nationals 27, National Labour 6, National 7, Labour 169, Liberals 18, Independent Labour Party 3, Independent 21, Communist 1, Commonwealth 3. The new parliament was elected under the provisions of a Redistribution act passed in 1944, enlarging temporarily the membership from 615 to 640. Special arrangements were made for the services to record their vote. After the general election the state of the parties was: Labour 393, Conservative 197, Liberal National 13, National 6, Liberal 11, Independent Labour Party 3, Independent 14, Communist 2, Commonwealth 1. Churchill resigned on July 26 and Attlee formed a Labour government on strictly party lines. The small war cabinet of wartime was replaced by one of 20 with 12 other ministers holding cabinet rank without being members of it. Colonel Clifton Brown (Conservative) was re-elected speaker in accordance with tradition, and Herbert Morrison became lord president of the council and leader of the house.

On Aug. 15, 1945, the king opened the 38th parliament in state. The date corresponded with the announcement of the unconditional surrender of Japan, and once again parliament went in procession to service at St. Margaret's. On Aug. 21 the king and queen again attended parliament to receive from both houses, in the presence of representatives of the dominions, the colonial empire and the United Nations, addresses of congratulation on victory. On Aug. 24 a select committee was appointed to consider procedure in the public business of the house and to report what alterations if any were desirable for its more efficient dispatch. On Oct. 24 an interim report was issued suggesting certain alterations in procedure particularly with regard to the committee stage of bills. A bill nationalizing the Bank of England passed through all its stages.

Two minor cabinet reconstructions were undertaken by the prime minister, the most important alteration being the elevation of A. Creech Jones to cabinet rank as the new secretary of state for the colonies. Though conversations of far-reaching importance were taking place in India, Egypt and Palestine, and many commitments were being made in regard to the establishment of a peace or-

ganization, the government passed a record amount of legislation. The most important bills were the Civil Aviation act, the Coal Industry Nationalization act, the National Insurance act, the National Health act and the Trades Disputes and Trades Union act. The government announced the continuation of conscription before prorogation of the initial term of the victory parliament on Nov. 6. The second session of the 38th parliament was opened by the king on Nov. 12, 1946.

The decade 1937-46 ended as it began, with momentous problems confronting parliament. What emerged, inasmuch as parliamentary government is concerned, was that the constitution was flexible enough to stand the strain imposed upon it, and that the British people through their elected representatives had maintained their control. (See also LAW.) (I. M. B. W.)

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Parrado y Garcia, Augustin

Cardinal Parrado y Garcia (1872-1946), Spanish prelate, was born Oct. 5, 1872, at Fuentes de Saldana in Valladolid province, Spain. He was ordained to the priesthood in 1895 and was professor of Latin, literature and theology at the Valladolid seminary. Later, he was appointed chancellor of the diocese of Astorga and Salamanca. Consecrated bishop of Palencia in 1925, he became an archbishop in 1934, with authority over the metropolitan see of Granada.

On Dec. 23, 1945, he was nominated to the Sacred college of cardinals and was proclaimed a cardinal at consistory, Feb. 18, 1946.

Cardinal Parrado died at Granada on Oct. 8, 1946.

Parri, Ferruccio

Parri (1890-), Italian statesman and politician, was born in Turin. A schoolteacher, Parri joined the army when Italy entered World War I, was wounded and decorated four times. After the war, he was assistant editor of the liberal newspaper, *Corriere della Sera*, but resigned in 1925 when its editor in chief had been replaced by a fascist. He opposed the Mussolini dictatorship, participated in an underground antifascist organization and spent a number of years in Italian prisons for his revolutionary activities.

During World War II, Parri headed a well-organized Italian partisan group. He helped establish the Action party, a mildly leftist group, and on June 17, 1945, he was designated to form a cabinet. His government contained representatives of the six major Italian parties. However, as real power was vested in the Allied military government, Parri's political authority was restricted. In the late fall of 1945, the conservative parties in the government provoked a crisis that resulted in Parri's ouster.

(Nov. 24) and his replacement as premier by Alcide de Gasperi. He resigned from the Action party, Feb. 11, 1946, because of its refusal to oppose "ideologies of extremist character and conservative and reactionary forces," and said he would form a new Republican party.

Particles, Fundamental

See PHYSICS.

Partisans

See GUERRILLA WARFARE; TACTICS OF WORLD WAR II; WORLD WAR II.

Patch, Alexander McCarrell, Jr.

Patch (1889–1945), U.S. army officer, was born Nov. 23, 1889, at Ft. Huachuca, Ariz., the son of an army officer. He was graduated from West Point in 1913. During World War I, he saw active duty in France and on his return to the U.S. became a member of the faculty at Staunton Military academy, Virginia, 1920–24. Promoted to the rank of major general in March 1942, Patch was placed in command of operations on Guadalcanal in Jan. 1943, when army troops relieved marines on the island; by the following month, the Japanese had been driven from the island. Patch then was transferred to the European theatre of operations and on March 21, 1944, was given command of the 7th army. On Aug. 16, the 7th army invaded southern France. Two days later Patch was named for promotion to the rank of lieutenant general. His forces established contact with Gen. George S. Patton's 3rd army north of Dijon, Sept. 11, 1944, and joined the combined assault on the reich. In 1945 the 7th army drove northward through the Vosges and the Siegfried line, over the Rhine and into Austria. Patch was replaced as head of the 7th army in June 1945 by Lt. Gen. Wade H. Haislip, and returned to the United States where he was given command (July 7) of the 4th army with headquarters at Fort Sam Houston, Tex. On Oct. 8 it was announced that he had been named head of a special board designed to study the size and requirements of the army of the postwar era. He died of pneumonia in San Antonio, Tex., Nov. 21, 1945.

Patents

In the ten years 1937–46 substantial changes were made in the patent laws of almost every important industrial country. In Germany, Denmark and the U.S.S.R. new patent statutes were enacted, and in Great Britain and the United States important alterations in the patent laws were effected. In France the patent term was enlarged from a 16-year term to a 20-year term.

Throughout the world the patent systems were under examination and study. In Great Britain, a departmental committee was appointed in April 1944 to report upon desirable changes in the patent law and its administration. That committee delivered reports in March 1945 and April 1946 which proposed fundamental changes in the examination practice in the British Patent office.

In the United States the patent system was one of the subjects under examination of the Temporary National Economic committee in 1938 and 1939, and that committee made several recommendations for changes in the patent laws. Many of these were enacted in 1939, among them the important provision that required the filing of a patent application within one year instead of two years after the invention had come into public use and sale or had become published. Subsequently several congressional committees undertook examination of various phases of

the patent system, and the president appointed the National Patent Planning commission, which continued from 1942 through 1945 and delivered three reports dealing with various phases of its study. These reports recommended the simplification of patent procedure, limitation of the term of patents and establishment of a separate administration of patents owned by the government. The final report of the National Patent Planning commission pointed out a large number of questions with respect to the patent law and recommended further study thereof.

In 1945 the secretary of commerce set up the Patent Survey committee to make a full and objective study of the operation and effectiveness of the patent laws and their relation to the antitrust laws and postwar economy.

World War II had serious effects upon the operation of the patent offices throughout the world. In many countries the physical equipment was destroyed, and in every country involved in the war there was serious interruption in the work of the patent office. The failure of communications throughout the world prevented most inventors from filing their applications in foreign countries under the international practices and required the passage of corrective legislation in every country. With the end of the war most patent offices were reduced in staff and were confronted with enormously increasing burdens of work caused by the undisposed accumulation of patent applications and increased flow of new applications. In several countries the increased flow exceeded that of any earlier period and indicated an expanded research activity throughout the world.

The seizure of great numbers of axis-owned patents by each nation introduced a new problem in their administration. In the United States, Great Britain and France these patents were made available for general licensing, and that policy was being advocated for general adoption throughout the industrial world. (C. W. O.)

Postwar Problems.—The task of restoring normal patent relations between the various countries after the war was necessarily one of considerable difficulty. For instance, all existing German-owned patents in Allied countries at war with Germany had been seized. To some extent the disposition of these patents was determined by an accord signed in London on July 27, 1946, which came into force on Nov. 30, 1946, between France, India, the Netherlands, New Zealand, the Union of South Africa, the United Kingdom and the United States of America. This accord, which was open to acceptance by all members of the United Nations and by neutral countries, provided for the German-owned patents to be made freely available to the nationals of all countries party to the accord, subject only to the protection of non-German interests in such patents existing on Aug. 1, 1946. Further, the United Kingdom adopted an act under which no patent could be obtained in that country for an invention made in Germany or Japan between Sept. 3, 1938, and Dec. 31, 1945.

The general resumption of normal patent relations between the various countries necessarily depended, as between belligerents, upon the peace treaties, and as between other countries upon arrangements made between themselves. An agreement was made on Aug. 29, 1945, between the United Kingdom and France for the restoration of rights in industrial property affected by World War II, and the Swiss government issued an invitation to all countries belonging to the Industrial Property union to attend a conference to open at Neuchâtel on Feb. 5, 1947, for the purpose of signing an agreement for the restora-

tion of industrial property rights affected by the war on the lines of that made after World War I and signed at Berne on June 30, 1920. In 1946 a number of countries were considering the revision of their patent laws; in Great Britain a committee appointed in 1944 for this purpose issued two interim reports. (See also LAW.)

(H. L. SA.)

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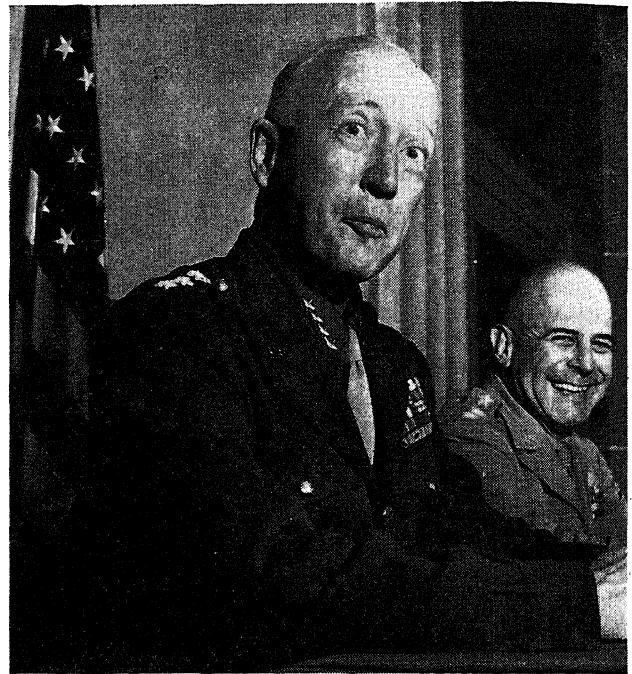
Patterson, Robert Porter

Patterson (1891–), U.S. government official, was born Feb. 12, 1891, in Glen Falls, N.Y. A graduate of Union college, 1912, he took his law degree from Harvard, 1915, and practised law in New York city. He served in the Mexican campaign (1916) and in World War I, during which he rose to the rank of major and was awarded the D.S.C. Patterson was judge of the U.S. district court for the southern New York district (1930–39), becoming judge of the U.S. circuit court of appeals in 1939. He resigned from the appellate court in July 1940 after his appointment as assistant secretary of war and five months later became undersecretary of war. Following Henry L. Stimson's resignation on Sept. 18, 1945, Pres. Truman named Patterson as his successor to the post of secretary of war. The following month, Patterson proposed (Oct. 17) creation of a single department of national defense headed by a cabinet officer with authority over all the services.

Throughout 1945 and 1946, Patterson pleaded for a strong army and decried democracy's "fatal tendency" to forget the army after a war. He said such a lapse would prove dangerous because "there are millions who hate us and will fan any flame that starts up."

Patton, George Smith, Jr.

Patton (1885–1945), U.S. army officer, was born Nov. 11, 1885, in San Gabriel, Calif. He was graduated from West Point in 1909, beginning his army career as a second lieutenant of cavalry. He was aide-de-camp to General Pershing during the Mexican expedition in 1916–17, and again in England during 1917. In France he organized and led the 1st U.S. tank brigade and was wounded in action in Sept. 1918. An expert on mechanized warfare, he became commander of the 2d armoured division in Nov. 1940. On April 4, 1941, he was promoted to major general. Soon after Pearl Harbor, he was made corps commander in charge of both the 1st and 2nd armoured divisions and organized the desert training centre at Indio, Calif. Patton was commanding general of the western task force during the U.S. operations in Africa in Nov. 1942, and handled the landing of U.S. forces on the western coast of Africa. He was promoted to the rank of lieutenant general in March 1943, and led U.S. forces in the Tunisian and Sicilian campaigns. In both operations, Patton displayed boldness and daring and emerged as a colourful figure. He had several sobriquets, the most popular of which was "Old Blood and Guts." Patton had a short temper which frequently involved him in "incidents," and during the Sicilian campaign he fell into temporary disgrace for striking an enlisted man. Reprimanded by Gen. Eisenhower, he later apologized to all present at the episode. Eisenhower later placed Patton in command of the



General George S. Patton, Jr., mugging for photographers, and Lieutenant General James Doolittle, during a press conference at Los Angeles in June 1945

U.S. 3rd army which, during the fighting in France and Germany in 1944 and 1945, distinguished itself with spectacular drives through German lines. In the Ardennes battle, Patton helped to contain the German counterattack and to rescue the isolated garrison at Bastogne. His forces were whipping their way through Bavaria and western Austria when the war ended. Patton was nominated by Pres. Truman, April 17, 1945, to the rank of full general. In September, Patton minimized the slowness with which the de-nazification program was being carried out; he likened the nazi party to the losers in an election between Democrats and Republicans back home. Eisenhower removed Patton from command of the 3rd army and as military governor of Bavaria on Oct. 7, and put him in charge of the U.S. 15th army, whose function was to compile a tactical history of the war. Patton was injured in an automobile accident near Mannheim, Germany on Dec. 9, 1945, and died at a 7th army headquarters station hospital at Heidelberg the following Dec. 21.

Paul I

Paul I (1901–), king of the Hellenes, was born Dec. 14, 1901, the third son of King Constantine and Queen Sophia, sister of Kaiser Wilhelm II of Germany. Paul was married on Jan. 9, 1938, to Princess Frederika Louise, daughter of the Duke of Brunswick. They had three children, Princess Sophia (b. Nov. 2, 1938); Prince Constantine (b. June 2, 1940) and Princess Irene (b. May 11, 1942). During World War II, Paul fled with the royal family in 1941 to South Africa and then to England, where he made common cause with the Greek government in exile. He returned to Athens Sept. 28, 1946, with his wife and brother, who had been restored to the throne as George II.

On the death of George II, April 1, 1947, Paul assumed the throne as King Paul I, sixth king of the Hellenes.

Paulus, Friedrich von

Paulus (1890?–), German army officer, was a col-

onel in the German war office in 1935 and was raised to the rank of a general in 1939. During World War II, he was commander of the German 6th army in the Stalingrad operations. His force, estimated to number about 330,000 men, besieged the soviet garrison in Stalingrad in the late fall of 1942 and was in turn besieged by the red army in an offensive started in November of that year. In the historic battle a large part of his army was destroyed and the German marshal surrendered Jan. 31, 1943. In the next few days, the remainder of the German forces trapped in Stalingrad surrendered.

He was held prisoner by the soviet command and the following year, Moscow Radio broadcast (Aug. 14, 1944), an appeal to the German people by Paulus to "remove Adolf Hitler, establish a new state leadership which will end the war" and re-establish amicable relations with the reich's enemies.

The field marshal testified for the prosecution at the Nuernberg war trials, asserting that Goering, Keitel and Jodl were the men chiefly responsible for Germany's attack on the soviet union. He declared that when he joined the high command on Sept. 3, 1940, he found that an operational plan for war against the U.S.S.R. was already being prepared.

"Pay-as-you-earn" System

See TAXATION.

Peace Negotiations, World War II

During 1946, the first peace settlements in connection with World War II were negotiated. These were the settlements in respect of Italy, Rumania, Bulgaria, Hungary and Finland, all of which countries had played, in varying degrees, some part in the war before the Armistice with Germany was signed. Although treaties of peace with these former axis countries were of comparatively minor importance as compared with the treaties of peace with Germany and Japan, which had still to be negotiated, the peace settlements with the satellites of Germany deserve careful study both in themselves and also for the light thrown upon the principles likely to be followed in negotiating the settlements with Germany and Japan.

Procedure.—It will be remembered that the Potsdam declaration issued at the conclusion of the conference held in Berlin in July and Aug. 1945 provided for the establishment of a Council of Foreign Ministers, composed of the foreign ministers of the United Kingdom, United States, the U.S.S.R., France and China. The immediate task of this council was to draw up, for submission to the United Nations treaties of peace with Italy, Rumania, Bulgaria, Hungary and Finland and to propose settlements of territorial questions outstanding at the end of the war in Europe.

For the carrying out of these tasks the council was to be composed of members representing states signatory to the terms of surrender imposed upon the axis state concerned, France being deemed to be a signatory in respect of Italy. There was also provision that when the council was discussing a matter of "direct interest" to a state not represented on the council, such state would be invited to send representatives "to participate in the discussion and study of that question."

The Potsdam declaration therefore contained no specific reference to the holding of a peace conference of all the Allied nations which had waged war against axis countries concerned, and the degree of "participation" to which Allied countries other than those represented on the Council of Foreign Ministers would be entitled was not made clear.

During the first unsuccessful meeting of the Council of Foreign Ministers held in London in Sept. 1945 strong claims were put forward by some of the Allied countries not represented on the council for recognition of their right to play a substantial part in negotiating the treaties. In particular the Australian foreign minister, H. V. Evatt, pressed the view that countries which had played a substantial part in the war against the satellites of Germany should either be associated with the council for the purpose of drafting treaties, or alternatively, that decisions reached by the council should be submitted to a free and open conference of all belligerents, which would have power to modify the decisions of the council.

Subsequently the foreign ministers of the United Kingdom, the U.S. and the U.S.S.R. met at Moscow in Dec. 1945. This conference confirmed the agreement reached at Potsdam as to the composition of the Council of Foreign Ministers for the purpose of drafting the treaties, but in addition agreed that, when the treaties had been drafted, a conference should be convoked for the purpose of considering the drafts which had been drawn up. This conference was to consist of "the five members of the Council of Foreign Ministers, together with all members of the United Nations which actively waged war with substantial military forces against the European enemy states, namely, the U.S.S.R., the United Kingdom, the United States, China, France, Australia, Belgium, Byelorussian S.S.R., Brazil, Canada, Czechoslovakia, Ethiopia, Greece, India, Netherlands, New Zealand, Norway, Poland, South Africa, Yugoslavia, the Ukrainian S.S.R." The conference was to be held not later than May 1, 1946, and it was agreed that on its conclusion the Council of Foreign Ministers would draw up the final texts of the peace treaties after consideration of the "recommendations" of the conference.

In accordance with the decision reached at Moscow, the Council of Foreign Ministers commenced the work of preparing draft treaties, but owing to difficulties in reaching agreement on the major issues of the treaty with Italy, it was not until July that the council was able to reach a decision on a new date for the opening of the Conference of 21 Powers, viz., July 29. Even at this stage, difficulties arose owing to the insistence of the soviet representative that China should not be associated with the other members of the council in issuing invitations to the conference and that the council should draw up binding rules of procedure for the conference.

Eventually, however, it was agreed that China should not be associated with the issue of invitations and that the council should draw up draft rules of procedure for the conference, on the understanding that these would be subject to confirmation by the conference itself.

The Paris conference, therefore, opened on July 29, 1946, at the Luxembourg palace.¹ A Commission on Procedure was set up at an early stage to consider the draft rules submitted by the Council of Foreign Ministers; in this commission there were heated debates, chiefly on the issue of the voting procedure to be adopted by the conference.

The commission adopted the provisions for conference

¹The nations represented, with their heads of delegation, were: France (Georges Bidault), U.S.S.R. (Vyacheslav M. Molotov), United Kingdom (Clement R. Attlee), U.S. (James F. Byrnes), Australia (Herbert V. Evatt), Belgium (Paul-Henri Spaak), Brazil (João Neves de Fontoura), Byelorussian S.S.R. (M. A. Kisselev), Canada (W. L. Mackenzie King), China (Wang Shih-chieh), Czechoslovakia (Jan Masaryk), Ethiopia (Ato Akilou Abte-Wold), Greece (Constantin Tsaladaris), India (Sir Samuel Rungtadhan), Netherlands (Baron van Boetzelaar van Oosterhout), Norway (Halvard Lange), New Zealand (H.G.R. Mason), Ukrainian S.S.R. (Dmitri Manuilsky), Union of South Africa (Maj. Gen. Frank Theron) and Yugoslavia (Edvard Kardelj).



organization suggested by the Council of Foreign Ministers. There was to be a Plenary conference consisting of the leaders of all delegations, which would make final recommendations to the council. A General commission was established to assist the Plenary conference and co-ordinate the work of all subordinate bodies. Nine treaty commissions were set up to carry out detailed study of the terms of the draft treaties. The political and territorial articles were referred to Political and Territorial commissions, one for each treaty, and the economic articles to two Economic commissions, one in respect of Italy and one for the remaining countries. The military articles of all treaties were referred to a Military commission, while a Legal and Drafting commission was also established. All states were entitled to representation on the two latter commissions. The membership of the Political and Economic commissions was restricted to the members of the Council of Foreign Ministers who had drawn up the relevant draft treaties, together with the member states who were at war with the axis state in question.

The main issue before the Commission on Procedure was the question of the majority required for adoption of a recommendation by the Plenary conference. Under the draft rules put forward by the Council of Foreign Ministers a two-thirds majority vote was necessary. This provision was regarded by a number of Allied countries as so restrictive as to threaten to stultify the work of the conference as a whole. It was pointed out by these countries that the four members of the Council of Foreign Ministers had already committed themselves, before the Paris conference opened, to support all draft articles on which they had previously reached agreement. The voting and influence of these great powers would therefore automatically be given and exercised with a view to preventing any substantial amendments to such articles being carried. This meant that in practice the freedom of the conference to make recommendations was likely to be confined to the comparatively few articles on which the Council of Foreign Ministers had failed to agree.

An amendment to the draft voting rules was therefore moved under which only a simple majority would be required for the adoption of recommendations by the Plenary conference. In answer to strong opposition by the representative of the soviet union, who claimed that adoption of such a rule would involve departure from the procedure adopted at the San Francisco conference, the Australian representative emphasized that the San Francisco conference had been concerned with decisions, while the Paris conference could make only recommendations which the Council of Foreign Ministers could, if they so chose, refuse to accept. He argued therefore that acceptance by the Paris conference of the two-thirds majority voting rule would make it impossible for the conference to carry out its task satisfactorily. Indeed, there was danger that adoption of a two-thirds majority rule would make it impossible for the conference to make any firm recommendations at all.

After a protracted discussion, a compromise proposal was submitted by the United Kingdom delegation under which recommendations of the conference were to be of two kinds, namely, those adopted by a two-thirds majority, and those adopted by a simple majority. It was implied that, while there was justification for transmitting to the Council of Foreign Ministers both kinds of recommendations, recommendations which had been voted by a two-thirds majority would carry greater weight. This United

Kingdom proposal was eventually adopted by 15 votes to 6, the minority being the U.S.S.R., Byelorussia, Poland, Czechoslovakia, Yugoslavia and the Ukraine. When this matter came before the Plenary conference for decision, the soviet delegation maintained its strong opposition and formally proposed that the commission's recommendation should not be accepted. The soviet proposal, however, was rejected by the Plenary conference by a two-thirds majority.

It will be seen therefore, that the procedure adopted in the negotiation of the peace settlements with the satellites of Germany was a compromise between two opposing points of view. The members of the Council of Foreign Ministers accepted the soviet view that participation by the other Allied countries who fought in Europe and the middle east should be limited to an expression of views to the Council of Foreign Ministers which the latter could accept or reject. The other Allied countries, led by Australia, claimed that such an attitude failed completely to recognize the importance of their military contributions to the defeat of Germany and its allies. These contributions, it was argued, entitled them to the fullest participation in the peace settlement negotiations at all stages. In the result, the Council of Foreign Ministers was able to secure acceptance of its right to make final decisions on the treaties. Members of the council were compelled, however, to yield some ground. In the first place, a conference of Allied countries which waged war actively against the satellites of Germany was in fact held. This conference gave an opportunity to the smaller powers to express in detail their views on the drafts prepared by the Council of Foreign Ministers. Again, although this conference had the power to make recommendations only, it successfully resisted Great Power attempts to restrict such recommendations to those supported by a two-thirds majority of the conference. The fight for establishment of democratic procedures therefore was to some extent successful, and a precedent was established to which the smaller powers would no doubt draw attention as representing a minimum of their requirements in connection with the peace settlements with Germany and Japan.

Substance.—It is not possible to refer in detail to all the main provisions of the treaties with Italy, Rumania, Bulgaria, Hungary and Finland. It is desirable, however, to indicate the kinds of sections which were included in all of the draft treaties submitted by the Council of Foreign Ministers and to give a short account of certain important provisions, which gave rise to great debate.

All the treaties were constructed on the following similar lines:

(a) *Preamble*, indicating the reasons for and objectives of the treaties.

(b) *Territorial Section*, dealing with any frontier adjustments or cessions of territory. Thus, the treaty with Italy provided for an adjustment of the frontier between France and Italy in favour of the former, and laid down a new frontier between Yugoslavia and Italy known as the "French line." It also provided for the cession of certain islands in the Adriatic to Yugoslavia and of the Dodecanese Islands to Greece. In other treaties, provision was made for restoration of prewar frontiers, with the exception that the frontiers between Hungary and Czechoslovakia and between Bulgaria and Greece were not to be determined finally until representatives of these countries had had the opportunity to present their views before the Peace conference.

(c) *Political Section*. Articles in this section common to all treaties dealt with such matters as assuring basic human rights to all citizens, apprehension of war criminals and annulment of prewar bilateral treaties unless both parties wished them to remain in force. The treaty with Italy also contained articles dealing with the creation of the free territory of Trieste, the

disposal of Italian colonies and the special interests of China, Albania and Ethiopia. In the remaining treaties was an article providing for the dissolution of all "organizations of a Fascist type."

(d) *Military Section.* All the treaties contained similar articles providing for destruction of frontier fortifications and limitation of armed forces and production of armaments to a level consistent only with the necessities of local defense and the maintenance of internal security.

Military Provisions of the East European Treaties

	Army	Navy		Air Force†	
		men	tonnage	men	planes
Bulgaria	56,800*	3,500	7,250	5,200	90
Hungary	65,000†	5,000	15,000	5,000	90
Rumania	125,000*	5,000	15,000	8,000	150
Finland	34,400*	4,500	10,000	3,000	60

*Including AA troops. †Including AA troops and river flotilla personnel.
‡Including naval air arm, if any.

(e) *Claims Arising Out of the War.* This section contained articles on reparations, restitution of looted property and claims by former axis countries. The Council of Foreign Ministers had reached agreement on the amounts to be paid in reparations to the U.S.S.R. by Italy, Rumania, Hungary and Finland (although the United States reserved its right to reopen the question in the case of Finland) and to Czechoslovakia and Yugoslavia by Hungary. Reparations from Italy to countries other than U.S.S.R. were to be left for consideration by the Peace Conference, and reparations from Bulgaria to Greece and Yugoslavia until the question could be discussed with the governments of those countries.

(f) *Property Rights and Interests.* Provision was made for the restoration of legal rights and interests of the United Nations and their nationals and for the return of their property. No agreed draft article was submitted on the question of compensation for damage. The soviet delegate had maintained that compensation should be paid in part only while the remaining members of the council had pressed for compensation in full. The section contained a further provision enabling the United Nations to take over axis property within their jurisdiction to the extent necessary to satisfy outstanding claims.

(g) *General Economic Section.* All treaties contained a provision for the granting of most favoured nation treatment to members of the United Nations which adopted reciprocal measures. The soviet representative on the council had sponsored a provision that most favoured nation treatment should not apply in certain branches of industry not run by private enterprise. This provision was opposed by the remaining members of the council, who wished to see the most-favoured-nation principle observed in any case of state-controlled industry in which foreign participation was allowed.

In the treaties with Rumania, Bulgaria and Hungary the representatives of the United Kingdom, the U.S. and France wished to include an article providing for freedom of navigation on the Danube. The soviet representative considered that inclusion of such an article in the treaties was unnecessary.

(h) *Final Articles.* Common to all treaties were the articles providing for the execution of the treaties, settlement of disputes regarding interpretation (on which the soviet representative had presented a separate draft) and ratification.

In considering the texts of the draft agreement drawn up by the Council of Foreign Ministers, the Paris conference could either approve or amend the draft text, choose between alternative drafts of certain articles on which the council had not reached agreement, or propose entirely new articles.

In order to obtain a true picture of the proceedings and work of the conference, it is necessary to refer to particular proposals made at the conference even though many of these proposals were not adopted by the Plenary conference because they did not receive the requisite majority of votes. It would be misleading to refer merely to the records of the final meetings of the Plenary conference because these records would make it appear that most of the work of the conference had consisted in mere approval of drafts submitted by the Council of Foreign Ministers. In fact, few of the draft articles were not seriously and fully discussed or met with immediate unanimous approval. If there were few significant changes in the draft treaties

after consideration by the conference, this indicated merely the unsatisfactory nature of the conference procedure and did not reflect satisfaction by the 21 countries with the treaties as originally drafted.

Amendments to the Draft Treaties.—One of the major issues of the Italian treaty discussions was the attempt of the Yugoslav delegation to have the frontier with Italy, proposed by the Council of Foreign Ministers, altered in Yugoslavia's favour. It was only after protracted discussion that the council had agreed to accept the frontier known as the French line. When the matter came before the Political commission for Italy the Yugoslav delegate submitted a long and detailed amendment. Another amendment was moved by the Byelorussian delegate and supported by the delegates of Ethiopia and Poland, that the town of Gorizia should be wholly included in Yugoslavia. None of these proposals received general support in the commission. The Yugoslav delegate also proposed that the free territory of Trieste should be confined to a smaller area, while an amendment was put forward for the enlargement of the territory by the inclusion of the predominantly Italian areas of the west coast of the Istrian peninsula. After long debates, the commission rejected all amendments by decisive majorities. When the votes had been taken the Yugoslav delegate, who had previously stated that the Yugoslav government would not sign a treaty which had the French line as a frontier, affirmed his position by informing the chairman of the commission that Yugoslavia would not consider itself bound by any decisions on questions directly concerning it and to which it had not given its consent.

Another major amendment was moved by the Australian delegation in the Economic commissions. The delegation proposed that the reparation articles of all treaties should be altered to provide for determination by a Reparations and Restitution commission of the amounts to be paid. This decision would be made in accordance with the actual proved losses suffered by the claimant states and after account had been taken of the capacity to pay of the former axis country concerned. The delegation also proposed an alteration in the method of payment from current production.

Payments were to be made in dollars, sterling or other currencies approved by the commission to an annual amount to be calculated as a proportion of the annual exports of the axis country concerned.

The proposal came first before the Economic commission for the Balkan nations during consideration of the Rumanian treaty. It was opposed by the soviet delegate on grounds that Rumania had agreed to the sum fixed and that if the Australian plan was adopted it would result in the matter being left unsettled by the conference and thus hinder the recovery of areas in the U.S.S.R. damaged by the Rumanian army. The soviet delegate also suggested that it was an attempt to throw Rumania into the "pound-dollar net." Other members of the Council of Foreign Ministers also supported the agreed draft, stating that it was desired to avoid delay in fixing the reparations figure, and suggesting that in view of the various problems involved, it would be difficult to get precision as to the proper figure even after prolonged consideration. The proposal was not pressed in this commission, but was put to a vote in the Economic commission for Italy, where it was rejected by a decisive majority.

In the final meetings of the commission however, a modified proposal was put forward to establish a commission which would deal only with the question of repara-

PEACE TREATIES OF PARIS

TERRITORIAL CLAUSES CONTAINED
IN TREATIES WITH FINLAND, ITALY,
HUNGARY, RUMANIA AND BULGARIA,
SIGNED ON FEBRUARY 10, 1947.

FINLAND

- 1A Pechenga (Petsamo) area returned to U.S.S.R.
- 1B U.S.S.R. obtains 50-year lease on Porkkala.
- 1C U.S.S.R. renounces lease on Hangö (Hanko).
- 1D Åland Islands to remain demilitarized.

ITALY

- 2A Five small areas along French border ceded to France.
- 2B Free Territory of Trieste placed under U.N. supervision.
- 2C Zara, Adriatic Islands and greater part of Venezia Giulia ceded to Yugoslavia. Pelagosa to remain demilitarized.
- 2D Italy to recognize Albanian independence.
- 2E Italy renounces claim to Saseno Island.
- 2F Dodecanese ceded to Greece and to be demilitarized.
- 2G Italy renounces claim to Libya, Eritrea and Italian Somaliland. Final disposition of colonies to be determined by Big Four within one year after Peace Treaty comes into force.

HUNGARY

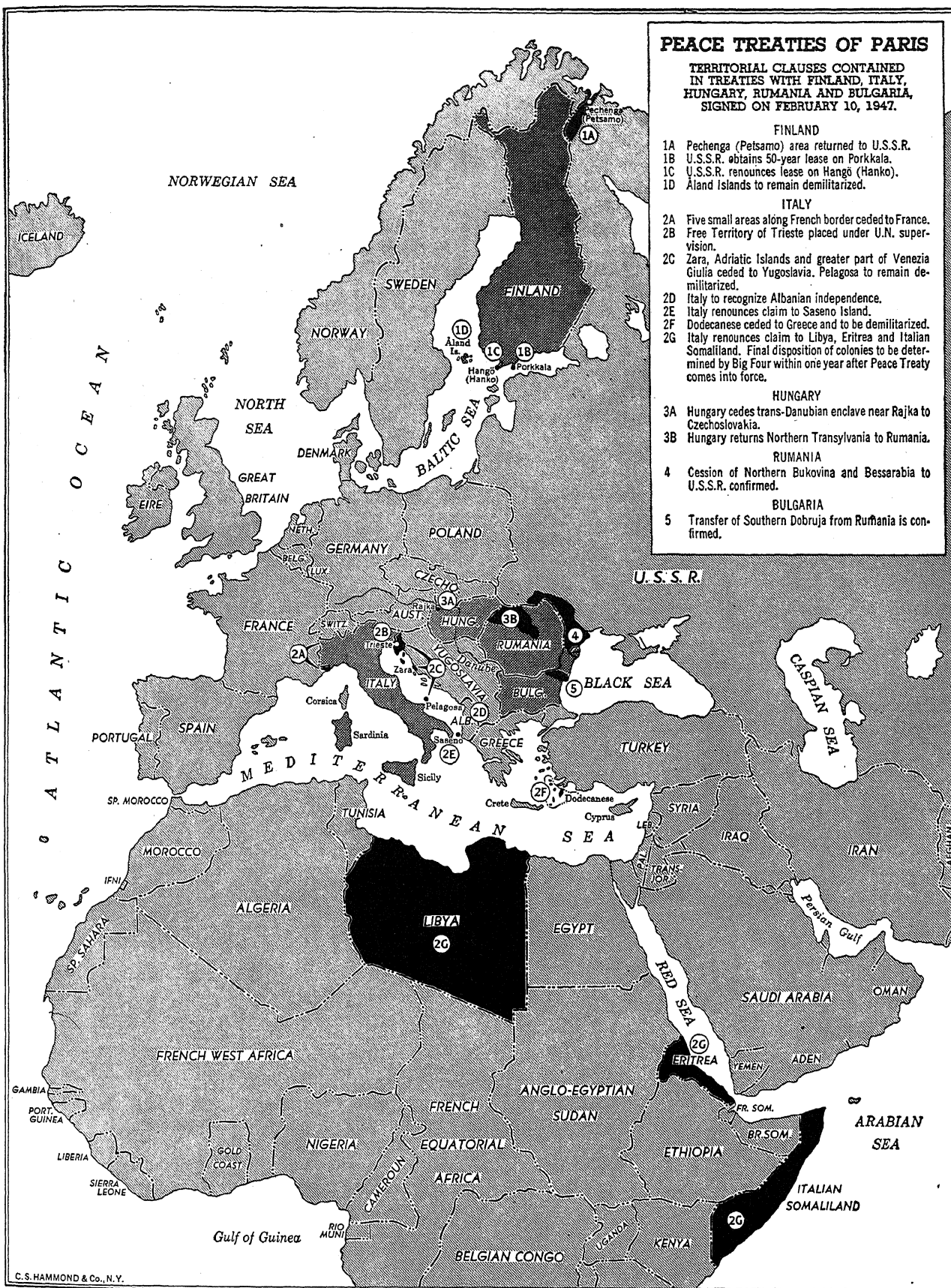
- 3A Hungary cedes trans-Danubian enclave near Rajka to Czechoslovakia.
- 3B Hungary returns Northern Transylvania to Rumania.

RUMANIA

- 4 Cession of Northern Bukovina and Bessarabia to U.S.S.R. confirmed.

BULGARIA

- 5 Transfer of Southern Dobruja from Rumania is confirmed.



tions to countries other than the U.S.S.R. and whose functions would be limited to the task of co-ordinating and supervising reparation payments. In its modified form, the proposal found more general acceptance, and was adopted by a simple majority.

Other amendments to the reparations articles were moved by the U.S. delegation. The draft article of the treaty with Hungary had specified that Hungary would pay a total of \$300,000,000 to the U.S.S.R., Czechoslovakia and Yugoslavia. The U.S. delegate, recalling that his coun-

try's representative on the Council of Foreign Ministers had reserved the right to bring the question up again at the Peace conference, proposed that in view of the precarious state of Hungary's economy, the total amount to be paid should be reduced to \$200,000,000. The proposal was defeated by 7 votes to 5, with 2 abstentions. A similar U.S. proposal to reduce the amount of reparations to be paid by Finland was ruled out of order by the chairman of the commission on the ground that it had been submitted too late.

New Proposals.—The fate of many of the proposed additions to the draft treaties was similar to that of the major amendments. It is true that the Political commission for Italy did accept, in the face of opposition from the soviet delegate, a proposal sponsored by the delegations of Belgium and the Netherlands that the treaty should contain formal recognition of an agreement between Italy and Austria regarding guarantees for the German speaking population of the Italian provinces of Bolzano and Trento. This commission, however, rejected a Polish proposal that an article should be included in the treaty, similar to those in the remaining treaties, prohibiting organizations of a fascist type. A Yugoslav proposal that, for the purposes of the treaty with Italy, Albania should have the rights of an associated power was also rejected.

Two other major proposals rejected by the conference were submitted by the Australian delegation. The first was a proposal to provide in the treaties for the establishment of a special court of human rights which would act as a supreme tribunal for the enforcement of those provisions of the treaties relating to citizenship and other human rights and fundamental freedoms. It was suggested that this court could be brought into special relationship with the Commission on Human Rights established by the Eco-

nomic and Social Council of the United Nations. In support of the proposal it was argued that unless the treaties themselves made available effective enforcement machinery, the basic rights conferred by the treaties might become a dead letter. The right of invoking the jurisdiction of the court, subject to reasonable conditions being laid down, would extend to individuals as well as to states, and its judgment would be accepted under the treaty as enforceable not only against individuals or groups, but also against states and local agencies.

The soviet delegation raised various objections to this proposal, suggesting *inter alia* that it was an infringement of the sovereign rights of the signatories to the treaty. The proposal was also criticized on the ground that the composition of the court and its procedure had not been made sufficiently precise and also on the ground that it was incomplete because if adopted it would result in the establishment of a European rather than a world court. Various delegations expressed sympathy with the proposal but considered that it was a matter for discussion in the United Nations rather than the Paris conference. The Australian amendment was rejected by 15 votes to 4.

The second major proposal was for the establishment of machinery for revision of the treaties. The Australian delegation proposed that an executive of the Paris conference should be set up consisting of the four members of the Council of Foreign Ministers who had prepared the draft treaties, together with three other belligerents nominated by the conference. This executive should have power by two-thirds majority to call a meeting of countries represented at the conference to consider revision of any portion of the treaty. If no treaty revision had taken place at the end of five years, a simple majority would be sufficient to decide that such a meeting should be called. The proposed revision however would be effective only when ratified by two-thirds of the nations represented at Paris, including the above-mentioned four powers. Although this proposal was defeated when raised in the final plenary session, 6 votes were cast in its favour and 3 countries abstained from voting.

Consideration of Articles on which no Agreed Draft was Submitted.—These articles fell into two categories, those on which a final decision on matters of detail was left to the conference, and those on which the Council of Foreign Ministers had been unable to reach any agreement at all.

In the first category, the most important issue was that of the future of Trieste. The council had agreed that the city with its immediate neighbourhood was to be constituted as a free territory, and that its independence and integrity were to be assured by the Security Council of the United Nations. Recommendations for a provisional government and for a permanent statute for the free territory were to be left to the Peace conference.

The council had appointed a special commission to consider the question and present preliminary suggestions to the Peace conference. Members of the commission had been unable to reach general agreement, and their suggestions were therefore presented to the conference in the form of four separate draft statutes. The drafts submitted by the representatives of the United Kingdom, the U.S. and France differed only in minor points, but all differed widely from that of the soviet representative. The position was further complicated by the submission of an additional draft statute by the Yugoslav delegation. The latter draft advocated the establishment of a special relationship between the free territory and Yugoslavia, under which the foreign relations of the free territory would be conducted

"The Kibitzer," a humorous picture of the very real anxiety with which Bulgaria, Hungary and other small nations followed the deliberations on European boundary changes at the 1946 Peace conference in Paris. Werner's cartoon from the *Chicago Sun*



by Yugoslavia, and which provided for customs, railways and postal unions between the two states.

The initial debate on Trieste in the Political commission for Italy emphasized the wide differences evident from the draft statutes, between the views of the western powers on the one hand and the U.S.S.R. and Yugoslavia on the other. The former affirmed that the free territory should be completely independent, and that in view of the existing political difficulties in Trieste, the governor of the free territory should have the power of veto over any measures passed by the legislative assembly and should also have certain reserve powers in regard to law and order. The latter insisted that power should reside in the legislative assembly and that the duties of the governor should be confined to supervision of the statute on behalf of the Security council.

The appointment of a subcommission to consider the draft statutes did little toward effecting a compromise, the subcommission being unable to present an agreed report. In the final debate in the full commission, an attempt was made by the Polish delegate to have the whole question referred back to the Council of Foreign Ministers. The attempt was unsuccessful and the commission was called upon to vote on three separate proposals submitted respectively by the French, U.S. and soviet delegates. The French proposal embodied the views favoured by delegates of the western powers, emphasizing the necessity for complete independence of the free territory and for some limitation on the powers of the legislative assembly in view of the governor's responsibilities to the Security council. The U.S. proposal concerned only the renunciation of Italian sovereignty over the free territory and the establishment of a provisional regime by the Security council. Both proposals were adopted by a two-thirds majority, in the face of opposition by the delegates of the U.S.S.R. and other eastern European states. The soviet proposal, except for two paragraphs which were common to the French proposal was rejected.

Although the conference did not completely fulfil its task of making recommendations for a provisional government and a permanent statute, it was significant that on this difficult issue it did provide a definite recommendation on the general principles on which the Council of Foreign Ministers were to work in completing details.

Another issue regarding which positive work was done by the conference was the question of the frontier between Hungary and Czechoslovakia. The Council of Foreign Ministers had agreed to the restoration of the 1938 frontier but had deferred confirmation of their agreement until the views of both governments concerned should have been heard either by the council or by the Peace conference. When the question came up before the Political commission for Hungary, the Czechoslovak delegate proposed that the frontier should be adjusted by the cession to his government of five village areas opposite Bratislava, capital of Slovakia. The Australian delegate, in accordance with the general policy of his delegation in territorial disputes, moved that a fact-finding subcommittee should be set up to consider the Czechoslovak claim and report the full facts to the full commission. The motion was adopted, and the subcommittee after full investigation recommended that the Czechoslovak claim should be upheld in respect of three villages only. The subcommittee was also entrusted with the consideration of a second Czechoslovak claim, that 200,000 Magyar inhabitants of the country be transferred to Hungary. On this question the subcommittee was able to bring about conversations between the parties to the disputes, with the result that it was able to recommend that

the question be left for negotiation at a later date. Both of the subcommittee's recommendations were accepted by the full Political commission.

Under the second category of articles on which no agreed drafts were submitted to the conference, the most important issues were those of compensation for damage to United Nations property in former axis countries and a future regime for the Danube. On the former question the soviet representative on the Council of Foreign Ministers had presented a draft demanding compensation at the rate of one third of the value of the property concerned, while the other three representatives had pressed for full compensation. During debate in the Economic commission for Italy, where the matter was first discussed, the U.S. delegate announced that his government no longer favoured full compensation and would submit a new proposal that the rate should be only 25%. This proposal was supported by the soviet delegate, but was defeated on a vote, as was the United Kingdom proposal for full compensation. Finally, a French compromise proposal was accepted that compensation should be paid at the rate of 75%.

On the question of the Danube, it will be recalled that the soviet representative on the Council of Foreign Ministers had been opposed to any reference to freedom of navigation in any of the treaties with Danubian states. In the relevant treaty commissions a soviet proposal to this effect was defeated, and the commissions accepted a French resolution covering freedom of navigation and providing for a conference to determine a future international regime for the Danube.

Final Meetings of the Plenary Conference.—The final business of the conference took place in plenary sessions from Oct. 5 to 15, when reports of the treaty commissions were considered and the recommendations of the conference to the Council of Foreign Ministers were made. After general speeches by delegates each treaty was put to the vote article by article. Delegations had the right to ask for a vote on any amendment or proposal even if it had not been accepted by the treaty commissions. There was, however, no significant change in the voting of the commissions.

At the final meeting, a letter was received by the chairman from the leader of the Yugoslav delegation in which the latter stated that in view of the unsatisfactory method adopted by the conference for reaching decisions, he felt unable to attend.

* * *

IN CONSIDERING the achievements of the Paris conference, it is necessary to keep constantly in mind the severe restrictions pointed out above under which it had to operate. This was not a conference empowered to take decisions on the substance of the treaties to be signed with the satellites of Germany. The conference had power only to make recommendations which the Council of Foreign Ministers could subsequently approve or disapprove as it thought fit. Moreover, the recommendations made by the conference based on a two-thirds majority or even a simple majority vote could be obtained only with great difficulty, because the four inviting Powers had undertaken to oppose any amendment put forward during the conference to those articles in the draft treaties on which all had previously agreed. This meant that for the most part four votes were automatically cast against recommendations for amendments of the draft treaties while the prestige and influence

of these countries affected substantially the votes of a number of other Allied countries.

Nevertheless, it can be said that the Paris conference had considerable value because the decisions of the Council of Foreign Ministers were put to the test of public criticism by a wide range of interested countries who had established their claim to criticize by their contribution to the war effort.

No account of the proceedings at Paris would be complete without a brief reference to the decisions taken subsequently at New York by the Council of Foreign Ministers on the recommendations made by the conference. The council made it quite clear that it felt free to reject recommendations of the conference if it thought fit. Thus, changes were made in the reparations figures which Greece and Yugoslavia were to receive from Italy and from Bulgaria respectively. Again, the conference recommendation that a conference should be called within six months of the coming into force of the treaties with Rumania, Bulgaria and Hungary to determine the regime to be established in relation to the Danube was rejected by the council, which decided instead to issue a Four-Power declaration on the subject.

On the other hand, a number of recommendations made by the conference were adopted by the Council of Foreign Ministers without alteration. Even on the contentious subject of Trieste, although certain changes were made, the council followed closely the principles of settlement recommended in Paris.

It could be said therefore, that the effect of the Paris conference upon the provisions of the treaties of the satellites of Germany was far from negligible. Indeed it was an important precedent which could be quoted in the future by those countries who claimed that a just and lasting peace could be established only if democratic procedures were adopted in the negotiation of the peace settlements. A public world forum was established at Paris, and the view subsequently expressed by countries like Australia was that the procedure at Paris could be expanded and extended when the final settlement came to be made with Germany and Japan.

(H. V. E.)

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Peaches

See FRUIT.

Peanuts

The total production of peanuts in the United States had been fairly stable from 1919 until 1940, when it became a war crop. The acreage had expanded slowly from about 1,700,000 ac. in 1919 to 2,500,000 ac. in 1937. An increasing proportion of the crop was harvested for the nuts as the demand for oil increased. The crushing of nuts in the United States was small until 1934, when farm prices increased from the low level of 1930-31. In that period the price dropped from the previous ten-year average of about five cents per lb. at the farm to less than one cent per lb.

After 1940, prices rose rapidly to over 8 cents per lb.—also the average in 1919. The development of food products such as peanut butter, candy and salted peanuts increased U.S. domestic consumption before World War II. Total production of peanuts was 1,232,755,000 lb. in 1937 and expanded to a record of 2,211,535,000 lb. in 1942—more than 150% above the prewar average, 1930-39. Another crop almost as large was harvested in 1945, but the output declined in 1946. The yield per acre varied widely from a

Hydraulic press producing peanut oil in Terrell county, Ga. A source of glycerine for munitions, production of the oil was speeded up during World War II



high of 857.7 lb. in 1940 to 607.7 lb. in 1943. The average of 1934-43 was 728 lb. per ac. The acreage grown for pig feed to be grazed amounted to about 1,000,000 ac. in 1937 and increased to a high of 1,970,000 ac. in 1943. Large acreages were grown for hay in Georgia and Alabama. The crop grown for nuts had long centred in Georgia and Alabama, which together produced about half of the United States total during the decade 1937-46. Texas and Oklahoma expanded the crop during the decade.

U.S. Peanut Production by Leading States, 1937-46
(In millions of pounds)

	1937	1939	1941	1942	1943	1944	1945	1946
U.S. Total . . .	1291.	1179.	1476.	2211.	2199.	2336.	2061.	2091.
Georgia . . .	488.0	341.2	488.2	627.6	765.3	683.6	709.9	704.6
Texas . . .	116.1	129.4	368.0	430.0	298.9	325.8	330.9	351.4
Alabama . . .	230.7	128.2	224.0	335.4	416.1	327.6	340.9	306.6
North Carolina . . .	256.2	290.7	284.7	332.1	301.9	343.9	296.4	281.2
Virginia . . .	145.2	189.1	157.5	175.9	174.7	191.1	151.3	177.1
Oklahoma . . .	17.0	15.6	40.8	151.0	61.8	111.1	108.0	124.0
Florida . . .	56.2	37.4	61.1	69.6	75.2	72.8	71.5	66.0
South Carolina . . .	8.4	11.8	13.6	28.8	37.4	25.4	25.0	20.4
Mississippi . . .	17.3	14.0	15.5	30.0	18.4	12.5	13.0	11.7
Tennessee . . .	6.9	6.0	6.0	6.7	13.3	8.2	6.6	5.1
Arkansas . . .	11.0	10.2	10.5	15.2	12.3	6.0	5.1	4.2
Louisiana . . .	7.5	6.1	4.5	8.8	9.0	2.4	2.8	2.6

World production of peanuts increased steadily after World War I; frequently they made up the largest single vegetable oil crop. The world's production was estimated at 3,333,000 metric tons in 1909-13 and 7,901,600 metric tons in 1934-39. War needs stimulated an increase of about 10% above the prewar average. Most of this increase was in French West Africa. The leading countries in peanut production in the prewar period 1934-39 were India, China, French West Africa, United States and Nigeria in the order named. These countries produced about 85% of the world's production. Peanut oil, usually too costly for industrial uses, became a food of importance because of its high protein content. (See also VEGETABLE OILS AND ANIMAL FATS.) (J. C. Ms.)

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Pearl Harbor Inquiries¹

At 7:55 A.M. Honolulu time (1:25 P.M. Washington time) on Sunday, Dec. 7, 1941, without a previous declaration of war, Japanese air forces launched from aircraft carriers attacked the United States naval base at Pearl Harbor in the Hawaiian Islands. The forces of the United States were not on the alert, and the attack was a complete surprise. Army aeroplanes were caught on the ground, parked wing tip to wing tip; many were not refuelled, and their guns had been removed for cleaning; pilots were on four-hour call. Land-based anti-aircraft guns were not manned, and were without ammunition readily available. A large part of the Pacific fleet was in the harbour, including eight of its nine battleships.

A Japanese naval force had left the Kurile Islands for Hawaii on Nov. 25 (Hawaiian time). Following a northerly route, it refuelled at sea, approached undetected within 600 mi. of Hawaii by the evening of December 6, and made a fast night run to a point about 200 mi. north of Oahu, from which its planes were launched. Waves of the attack continued for two hours, when the raiders withdrew and were recovered by the carriers and the Japanese

force then escaped to Japan. In the attack the Japanese lost 29 planes, 5 midget submarines and fewer than 100 men. U.S. military and naval forces suffered the loss of, or severe damage to, 188 planes, 8 battleships, 3 light cruisers, 3 destroyers and 4 smaller vessels and a total of 3,435 casualties in personnel. It was one of the greatest military and naval disasters in U.S. history.

The first inquiry into the disaster was by the Roberts commission, appointed by Pres. Franklin D. Roosevelt and headed by Justice Owen J. Roberts of the supreme court, the other members being Adm. William H. Standley (retired), Rear Admiral Joseph M. Reeves (retired), Maj. Gen. Frank R. McCoy (retired) and Brig. Gen. Joseph T. McNarney. The commission began proceedings Dec. 18, 1941, and concluded them on Jan. 23, 1942. On the evidence then available, its conclusions were that Lieut. Gen. Walter C. Short, commander of the Hawaiian department, and Adm. Husband E. Kimmel, commander in chief of the Pacific fleet and commander of the United States fleet, had failed to exhibit qualities needed for high command, and their errors of judgment were primarily responsible for the disaster. General Short and Admiral Kimmel were relieved of their commands, were not assigned to any other duty, and later were retired.

Other inquiries were by the army Pearl Harbor board, (July 20-Oct. 20, 1944) and the navy court of inquiry (July 24-Oct. 19, 1944). These inquiries were supplemented by four independent investigations; one by Adm. Thomas C. Hart, retired, and another by Adm. H. Kent Hewitt, for the navy department; and one by Col. Carter W. Clarke and another by Maj. Henry C. Clausen, for the war department.

For reasons of military security, all these inquiries, held during World War II, were behind closed doors, and much of the testimony was withheld from the public. Their conclusions were conflicting as to the relative responsibilities of the commanders at Pearl Harbor and the high command at Washington. Many stories were circulated, not only as to the conduct of high military and naval officers in Washington, but as to the responsibility of the civilian heads of state, war and navy departments, and Pres. Franklin D. Roosevelt. It was obvious after hostilities ceased that the public demanded a full and open inquiry, and in Sept. 1945 the congress passed senate concurrent resolution No. 27, 79th congress, first session, constituting a joint congressional committee on the investigation of the Pearl Harbor attack.

The joint committee was constituted as follows: Sen. Alben W. Barkley (Dem.), of Kentucky, chairman; Rep. Jere Cooper (Dem.), of Tennessee, vice-chairman; Senators Walter F. George (Dem.), of Georgia; Scott W. Lucas (Dem.), of Illinois; R. Owen Brewster (Rep.), of Maine; and Homer Ferguson (Rep.), of Michigan; Representatives J. Bayard Clark (Dem.), of North Carolina; John W. Murphy (Dem.), of Pennsylvania; Bertrand W. Gearhart (Rep.), of California; and Frank B. Keefe (Rep.), of Wisconsin.

The joint congressional committee commenced open hearings Nov. 15, 1945, which were concluded May 31, 1946. Fifteen thousand pages of testimony were taken, and 183 exhibits were received. Transcripts of all the testimony taken in the prior investigations were added to the record. The joint committee report was filed July 16, 1946. A majority report (492 printed pages), was signed by Senators Barkley, George and Lucas, and Representatives Cooper, Clark, Murphy, Gearhart and Keefe. A

¹Because of the highly controversial nature of this article, it was submitted in manuscript to army and navy officials, for their personal views, prior to publication. While expressing general agreement with the contents, one naval officer to whom the manuscript was submitted believed that the fault of Admiral Kimmel and General Short had been overemphasized as against that of officials in Washington; objection was also taken to the statement that U.S. naval forces were not on the alert at Pearl Harbor. Army comment was, *inter alia*, that the alleged blame of General Marshall had been too greatly stressed.—EDITOR.

minority report was submitted by Senators Brewster and Ferguson. Representative Keefe appended to the majority report a statement of additional views of his own.

The committee was unanimous in the conclusion that General Short and Admiral Kimmel were at fault. The majority report stated:

8. Specifically, the Hawaiian commands failed—

(a) To discharge their responsibilities in the light of the warnings received from Washington, other information possessed by them, and the principle of command by mutual co-operation.

(b) To integrate and co-ordinate their facilities for defense and to alert properly the army and navy establishments in Hawaii, particularly in the light of the warnings and intelligence available to them during the period Nov. 27 to Dec. 7, 1941.

(c) To effect liaison on a basis designed to acquaint each of them with the operations of the other, which was necessary to their joint security, and to exchange fully all significant intelligence.

(d) To maintain a more effective reconnaissance within the limits of their equipment.

(e) To effect a state of readiness throughout the army and navy establishments designed to meet all possible attacks.

(f) To employ the facilities, matériel, and personnel at their command, which were adequate at least to have greatly minimized the effects of the attack, in repelling the Japanese raiders.

(g) To appreciate the significance of intelligence and other information available to them.

9. The errors made by the Hawaiian commands were errors of judgment and not derelictions of duty.

The minority report contained substantially identical findings. The main differences of opinion within the committee were as to the extent that deficiencies and mistakes of high army, navy and civilian officials in Washington contributed to the disaster.

The majority report criticized the war plans division of

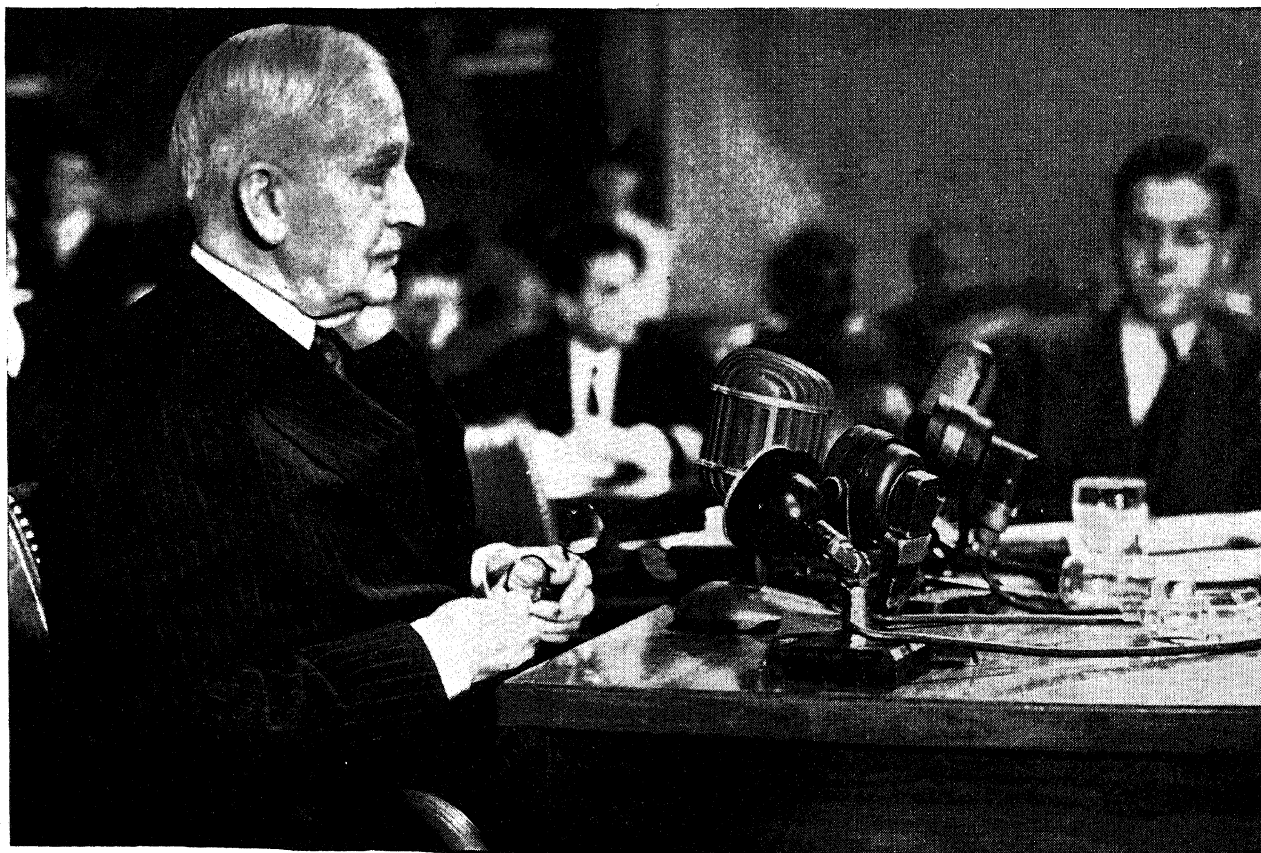
the war department for failure when war was imminent to make sure that General Short had alerted his command to possible air attack, found that the intelligence and war plans divisions of the war and navy departments had failed to evaluate properly information pointing to an air attack at Hawaii, and failed to be sufficiently alert Dec. 6 and 7 to evaluate intercepted Japanese messages indicating a Japanese attack at 1:00 P.M. Washington time (7:30 A.M. Hawaiian time) on Dec. 7. It placed no blame on the secretaries of state, war and navy, or on President Roosevelt. The minority report placed a measure of responsibility on the president, Secretary of War Stimson, Secretary of the Navy Knox as well as on Gen. George C. Marshall, chief of staff; Adm. Harold R. Stark, chief of naval operations; and Brig. Gen. Leonard T. Gerow, of the war plans division, mainly for deficiencies in organization and co-ordination of the military branches "particularly in the area of intelligence and unification of command." Representative Keefe, although signing the majority report, appended this criticism:

I feel that facts have been martialed, perhaps unintentionally, with the idea of conferring blame upon Hawaii and minimizing the blame that should properly be assessed at Washington. . . .

I cannot suppress the feeling that the committee report endeavors to throw as soft a light as possible on the Washington scene.

Admiral Richardson Episode.—In the spring of 1940 the Pacific fleet, then based on the U.S. Pacific coast, was sent to Hawaii on a training cruise. While there the president decided to shift its base to Pearl Harbor, believing that its presence there would be a deterrent to aggressive action by Japan in Asia. Adm. James O. Richardson, commander

Cordell Hull, testifying before the Pearl Harbor investigating committee in 1945, stated that on Nov. 27, 1941, he warned of a possible Japanese attack, but without specific mention of Pearl Harbor



in chief, United States fleet and Pacific fleet, vigorously protested, and insisted that the fleet be returned to the Pacific coast. He presented his protest to the president in person at Washington in Oct. 1940. As a result of this difference, Richardson was relieved of command in Jan. 1941, and was succeeded by Admiral Kimmel. The story had been circulated that Richardson had warned the president that the fleet was in danger at Pearl Harbor. The record later showed that Richardson, in his statement to the president and in a written memorandum to Secretary Knox, based his objections to keeping the fleet at Pearl Harbor entirely on the ground that the training facilities there were inadequate, and he made no suggestion that the fleet was in danger at Pearl Harbor. In a letter of Nov. 28, 1940, to Admiral Stark concerning the security of the fleet in the Hawaiian area, Richardson wrote:

This feature of the problem does not give me a great deal of concern, and, I think, can be easily provided for.

It was clearly established that the president did not place the fleet at Pearl Harbor as a bait for a Japanese attack, but solely for its deterrent effect on the Japanese.

Information that War was Imminent.—During 1941 diplomatic relations between the United States and Japan were becoming more strained. Washington was protesting against Japanese aggressions in Asia, especially in China. The diplomatic exchanges have been published by the state department in *Peace and War and Foreign Relations of the United States, Japan 1931-1941*. The most exact source of information available to the U.S. government as to Japanese intentions was intercepted and decoded messages between the Japanese government and its representatives in Washington and elsewhere. U.S. military and naval code experts had succeeded in "cracking" Japanese diplomatic and other codes. This work was "top secret" and conducted at Washington. It is enough here to begin with a message from Japan to the state department of Nov. 20, 1941. By that time the U.S. government had placed embargoes on shipment to Japan of war materials, including oil, and had frozen Japanese assets in the United States. It had also been furnishing war materials to China, without which the Chinese resistance would have collapsed. The message from Japan included the following demands:

4. The Governments of Japan and the United States mutually undertake to restore their commercial relations to those prevailing prior to the freezing of the assets.

The Government of the United States shall supply Japan a required quantity of oil.

5. The Government of the United States undertakes to refrain from such measures and actions as will be prejudicial to the endeavors for the restoration of general peace between Japan and China.

This meant not only the renewal of shipment of war material to Japan, but the cessation of aid to China and the abandonment of China to conquest by Japan.

Decoded messages from Tokyo to the Japanese ambassador in Washington stated that this was Japan's last proposal, and insisted that it be agreed to by the United States, as well as by Great Britain and the Netherlands, and set a deadline of Nov. 25, later extended to Nov. 29 Tokyo time. One such message, No. 736, intercepted Nov. 5, said:

Because of various circumstances, it is absolutely necessary that all arrangements for the signing of this agreement be completed by the 25th of this month.

Another, dated Nov. 11, said:

Judging from the progress of the conversations, there seem to be indications that the United States is still not fully aware of the exceedingly criticalness of the situation here. The fact remains that the date set forth in my message No. 736 is abso-

lutely immovable under present conditions. It is a definite dead line and therefore it is essential that a settlement be reached by about that time.

Another, dated Nov. 15, again said:

... the fact remains that the date set forth in my message No. 736 is an absolutely immovable one.

A third, dated Nov. 16, said:

... the fate of our empire hangs by the slender thread of a few days. . . .

In your opinion we ought to wait and see what turn the war takes and remain patient. However, I am awfully sorry to say that the situation renders this out of the question. I set the dead line for the solution of these negotiations in my No. 736, and there will be no change. . . . do not allow the United States to sidetrack us and delay the negotiations any further.

A decoded message of Nov. 22 from Japan to its ambassador said:

There are reasons beyond your ability to guess why we wanted to settle Japanese-American relations by the 25th, but if within the next three or four days you can finish your conversations with the Americans; if the signing can be completed by the 29th . . . we have decided to wait until that date. This time we mean it, that the dead line absolutely cannot be changed. After that things are automatically going to happen.

Bearing in mind that the Japanese expedition to attack Pearl Harbor sailed Nov. 25, the meaning of these messages later became unmistakable. Before Dec. 7, however, while not pointing to Hawaii as an object of attack, they did clearly show that the Japs intended to attack somewhere shortly after Nov. 29. To maintain as "top secret" the decoding of Japanese diplomatic messages, neither copies nor paraphrases of the above intercepted messages were furnished to Kimmel or Short. The evaluation of them made at Washington was reflected in the warning messages sent to Short and Kimmel Nov. 27. The real question was whether the evaluation reflected in the warning messages was an adequate one.

From Nov. 22 to Nov. 26 the president, Secretary of State Hull and high military authorities considered whether to temporize by proposing a *modus vivendi* to postpone a Japanese attack, to gain the time asked by General Marshall and Admiral Stark for further preparation for defense. The plan involved allowing shipments to Japan of limited quantities of oil, cotton and medical supplies. The Chinese protested, on the ground that any concessions to Japan would result in the collapse of China. Prime Minister Winston Churchill's comment was, "What about Chiang Kai-shek? Is he not having a very thin diet?" For these reasons, coupled with the belief that the decoded Japanese diplomatic messages showed that the Japanese would not consent to prolong negotiations, the *modus vivendi* was abandoned, and on Nov. 26 Secretary Hull gave the Japanese a message restating the U.S. position.

It later became clear that nothing the U.S. government could have said or done, after Nov. 20, short of a surrender of its position, would have prevented war. The Japanese were in a position in which they had to attack the United States to stop U.S. aid to China. It then seemed that Germany was about to crush Russia, and Japan had a reason to enter World War II before a German victory in order to make its western territorial claims against Russia as a cobelligerent. By Nov. 25, the authorities at Washington knew that war was imminent. Secretary Hull then warned the war and navy departments, and the president, that the "Japs mean to fight," that "a surprise attack might come at any moment," and the matter was "in the hands of the army and navy."

On Nov. 27 the navy department sent to Admiral Hart,

commander in chief of the Asiatic fleet, and to Admiral Kimmel, the following message:

This despatch is to be considered a war warning. Negotiations with Japan looking toward stabilization of conditions in the Pacific have ceased and an aggressive move by Japan is expected within the next few days. The number and equipment of Japanese troops and the organization of naval task forces indicates an amphibious expedition against either the Philippines, Thai or Kra peninsula or possibly Borneo. Execute an appropriate defensive deployment preparatory to carrying out the tasks assigned in WPL46. Inform district and army authorities. A similar warning is being sent by war department. Spenavo inform British. Continental districts Guam, Samoa directed take appropriate measures against sabotage.

This despatch was labelled for action by Hart and Kimmel and for information of other commanders.

On the same date the following despatch, signed "Marshall," was sent to General Short:

Negotiations with Japan appear to be terminated to all practical purposes with only the barest possibilities that the Japanese government might come back and offer to continue. Japanese future action unpredictable but hostile action possible at any moment. If hostilities cannot, repeat cannot, be avoided the United States desires that Japan commit the first overt act. This policy should not, repeat not, be construed as restricting you to a course of action that might jeopardize your defense. Prior to hostile Japanese action you are directed to undertake such reconnaissance and other measures as you deem necessary but these measures should be carried out so as not, repeat not, to alarm civil population or disclose intent. Report measures taken. Should hostilities occur you will carry out the tasks assigned in Rainbow Five so far as they pertain to Japan. Limit dissemination of this highly secret information to minimum essential officers.

A similar despatch was sent to General MacArthur in the Philippines, to the commanders on the Pacific coast and at the Panama Canal Zone.

General Short's only action was to alert his force at Hawaii against sabotage. Admiral Kimmel took no new precautions for defense of Pearl Harbor. In contrast, the commanders on the Pacific coast and at Panama, less exposed than Pearl Harbor, placed their forces on an all out alert against any form of attack. Hawaii was the only outpost that failed to institute a proper alert. Admiral Kimmel was not required to report measures taken. General Short sent the following reply:

Report department alerted to prevent sabotage. Liaison with navy.

On Dec. 3 the navy department sent Admiral Kimmel the following despatch:

Highly reliable information has been received that categorical and urgent instructions were sent yesterday to Japanese diplomatic and consular posts at Hongkong, Singapore, Batavia, Manila, Washington and London to destroy most of their codes and ciphers at once and to burn all other important confidential and secret documents.

Also the following despatch relating to Japanese codes:

Circular twenty four forty four from Tokyo one December ordered London, Hongkong, Singapore and Manila to destroy machine. Batavia machine already sent to Tokyo. December second Washington also directed destroy, all but one copy of other systems, and all secret documents. British admiralty London today reports embassy London has complied.

On Dec. 4, Admiral Kimmel received a copy of a despatch from the navy department to Guam ordering the destruction of secret and confidential publications.

While the authorities at Washington and the Hawaiian commanders knew by Nov. 27 that war was imminent and that the Japanese would attack somewhere, a clear distinction must be made between that information and information pointing to Pearl Harbor as the point of attack.

Possibility of Air Raid at Pearl Harbor.—In Nov. 1940 Admiral Stark asked Admiral Richardson for a report on the defense of Pearl Harbor against air attack. A report to the navy department prepared by Rear Admiral Claude C. Bloch, in command of the 14th naval district in Hawaii, disclosed that the defenses were inadequate. Thereafter, on Jan. 24, 1941, Secretary of the Navy Knox wrote to Secretary of War Stimson a letter, stating:

... If war eventuates with Japan, it is believed easily possible that hostilities would be initiated by a surprise attack upon the Fleet or the Naval Base at Pearl Harbor.

In my opinion, the inherent possibilities of a major disaster to the Fleet or naval base warrant taking every step, as rapidly as can be done, that will increase the joint readiness of the Army and Navy to withstand a raid of the character mentioned above.

The dangers envisaged in their order of importance and probability are considered to be:

- (1) Air bombing attack.
- (2) Air torpedo plane attack.
- (3) Sabotage.
- (4) Submarine attack.
- (5) Mining.
- (6) Bombardment by gun fire.

Defense against all but the first two of these dangers appears to have been provided for satisfactorily. The following paragraphs are devoted principally to a discussion of the problems encompassed in (1) and (2) above, the solution of which I consider to be of primary importance.

Both types of air attack are possible. They may be carried out successively, simultaneously, or in combination with any of the other operations enumerated. The maximum probable enemy effort may be put at twelve aircraft squadrons, and the minimum at two. Attacks would be launched from a striking force of carriers and their supporting vessels.

The counter measures to be considered are:

- (a) Location and engagement of enemy carriers and supporting vessels before air attack can be launched;
- (b) Location and engagement of enemy aircraft before they reach their objectives;
- (c) Repulse of enemy aircraft by anti-aircraft fire;
- (d) Concealment of vital installations by artificial smoke;
- (e) Protection of vital installations by balloon barrages.

The operations set forth in (a) are largely functions of the Fleet but, quite possibly, might not be carried out in case of an air attack initiated without warning prior to a declaration of war.

On Feb. 7, 1941, Secretary Stimson replied, expressing "complete concurrence" and discussing measures to improve army anti-aircraft defense. Copies of all these documents were furnished to Short and Kimmel.

From that time on the war department gave active attention to supplying additional fighter planes, anti-aircraft guns and radar detectors for the defense of Pearl Harbor, with the result, according to General Marshall, that in respect of those types of defenses Hawaii was relatively the best equipped station the United States possessed. The most serious deficiency was in long-range bombers suitable for long-range reconnaissance to detect the approach of a raiding force of carriers. Prior to Dec. 7, the desperate situation of the British caused the government to approve the delivery to them of hundreds of long-range planes, with only a dozen to the army at Hawaii. It was a deficiency in long-range army patrol planes to supplement his fleet patrol PBY's which later confronted Kimmel as war became imminent.

On Feb. 7 Marshall wrote to Short that he did not fear an enemy landing at Hawaii, but the real peril lay in sabotage and a surprise raid by air and by submarine. He stressed the point that Short's primary duty was the protection of the Pearl Harbor base and the Pacific fleet. Correspondence between Marshall and Short from Feb. to Oct. 1941 dealt with preparation against air attack.

On March 5, 1941, General Marshall wrote General Short:

I would appreciate your early review of the situation in the Hawaiian department with regard to defense from air attack. The establishment of a satisfactory system of co-ordinating all means available to this end is a matter of first priority.

In a letter to the chief of staff, dated March 6, 1941, General Short observed that the aircraft warning service was vital to the defense of the Hawaiian Islands. On April 14, 1941, General Short wrote the chief of staff, reporting on defense against an attack, and said:

The Navy has felt very much encouraged by the increase in our air and anti-aircraft defense.

On May 29, Short reported the result of war games, including a simulated air attack on Hawaii. On Aug. 19 General Marshall wrote Short, saying:

I feel sure that the Naval authorities comprehend fully the importance of adequate air defense of the Oahu Naval installation and accordingly, will entertain favorably any proposal which will implement the efficiency of such defense.

On Oct. 10 the chief of staff wrote Short, objecting to the latter's use of air personnel for ground duty, saying:

This seems inconsistent with the emphasis we are placing on air strength in Hawaii.

In March 1941 Captain P. N. L. Bellinger, commander naval base defense air force, and Major General Frederick L. Martin, commanding Hawaiian army air force, prepared a joint report covering joint army and navy air actions in the event of sudden hostile action against Oahu or fleet units in the Hawaiian area. It pointed out that "In the past Japan has never preceded hostile action by a declaration of war"; that "A successful sudden raid against our ships and naval installations on Oahu might prevent effective offensive action by our forces in the western Pacific for a long period"; and "It appears possible that Japanese submarines and/or a Japanese fast raiding force might arrive in Hawaiian waters with no prior warning from our intelligence service." Their report said:

It appears that the most likely and dangerous form of attack on Oahu would be an air attack. It is believed that at present such an attack would most likely be launched from one or more carriers which would probably approach inside of 300 miles.

Their estimate was that a dawn attack was the more likely, and that to avoid detection by Guam or Midway or task forces operating to the west, the Japanese would approach from the north or northwest.

In April 1941 General Short sent to the chief of staff a joint coastal frontier defense plan for army and navy forces at Hawaii, signed by General Short and Admiral Bloch, commanding the 14th naval district at Hawaii, to which was appended an agreement, approved by General Short, for joint defensive measures for defense of the Pearl Harbor base "against hostile raids or an attack delivered prior to a declaration of war." The army commander was to use planes, anti-aircraft guns and radar aircraft warning equipment. The navy's principal function was to conduct long-range air reconnaissance.

On April 1, 1941, the chief of naval operations at Washington sent to all naval districts the following dispatch:

Personnel of your naval intelligence service should be advised that because of the fact that from (sic) past experience shows the axis powers often begin activities in a particular field on Saturdays and Sundays or on national holidays of the country concerned, they should take steps on such days to see that proper watches and precautions are in effect.

In a letter of Aug. 20, 1941, to commanding general army air forces at Washington, transmitted through Gen-

eral Short, General Martin enclosed a copy of a report prepared by him on long-distance reconnaissance from Hawaii, which contained the following:

The Hawaiian Air Force is primarily concerned with the destruction of hostile carriers in this vicinity before they approach within range of Oahu where they can launch their bombardment aircraft for a raid or an attack on Oahu. . . .

Our most likely enemy, Orange (Japan), can probably employ a maximum of six carriers against Oahu. . . .

The early morning attack is, therefore, the best plan of action open to the enemy. . . .

It is the opinion of some individuals that a late afternoon attack is highly probable since it permits an enemy carrier to escape under cover of darkness. This presupposes that search operations are impracticable. This headquarters cannot subscribe to this opinion for the following reasons:

(1) A minor surprise raid such as a single carrier is not a logical method of attack to reduce the defenses of Oahu.

(2) It permits us to operate against him for a long period on D-Day at close range.

(3) The enemy will be more concerned with delivering a successful attack than he will be with escaping after the attack. He will have carefully considered the cost of the enterprise, will probably make a determined attack with maximum force and will willingly accept his losses if his attack is successful. . . .

The most favorable plan of action open to the enemy, and the action upon which we should base our plans of operation is the *early morning attack* in which the enemy must make good the following time schedule:

(1) Cross circle 881 nautical miles from Oahu at dawn of the day before the attack.

(2) Cross circle 530 nautical miles from Oahu at dusk of the day before the attack.

(3) Launch his planes 233 nautical miles from Oahu at dawn the day of the attack.

(4) Recover his planes 167 nautical miles from Oahu 2:30 after dawn the day of the attack. . . .

He (Japan) will not have unlimited avenues of approach for his attack.

a. He must avoid the shipping lanes to negate detection.

b. Any approach to Oahu which is made from east of the 158th meridian materially increases his cruising distance and the probability of detection by friendly surface vessels. It seems that his most probable avenue of approach is the hemisphere from 0° (due north) counterclockwise to 180° around Oahu; the next probable, the quadrant 180° counterclockwise to 90°; the least probable, 90° to 0°.

In Pacific fleet confidential letter from Admiral Kimmel to the Pacific fleet, issued Feb. 1941 and reissued in revised form Oct. 14, 1941, he said:

That a declaration of war may be preceded by—

(1) A surprise attack on ships at Pearl Harbor.

(2) A surprise submarine attack on ships in operating area.

(3) A combination of these two.

. . . it must be remembered too, that a single submarine attack may indicate the presence of a considerable surface force probably composed of fast ships accompanied by a carrier.

During 1941 war games conducted by the forces at Hawaii included defense against simulated air attacks by carrier planes. As late as the first week of Dec. 1941 Admiral Kimmel objected to sending marine anti-aircraft guns and gunners to islands farther west, on the ground that the equipment was needed for defense at Oahu.

Long before Dec. 7, 1941, it was known that the main campaign of the Japanese would be toward Indo-China, the Dutch East Indies and Malaya. If a surprise attack was to be made, it was not there. An attack on the Philippines was almost certain. In retrospect it seemed clear that for a daring surprise attack at the outset of hostilities, there were two tempting targets between which the choice lay—the Panama canal and the Pacific fleet at Pearl Harbor, with the latter preferred because it was more accessible, and because success there would relieve the Japanese

force moving down the Asiatic coast from the menace of a powerful fleet on its flank.

On this record it is hard to understand why, at the last, the possibility of an air attack faded from the minds of the commanders at Hawaii, as well as those at Washington. As Dec. 7 approached, they seemed to have concluded that such an attack was quite improbable. The dominant view was that chances of discovery and loss of the attacking force presented too great a hazard to Japan. Added to this was the mistaken view that the Japanese navy and naval air force were not sufficiently equipped or trained to deliver an attack. Only if U.S. forces had been alert would it have been too hazardous a venture; but Hawaii was not alert and the Japanese knew it, as their agents in Hawaii had every facility for communicating with Tokyo. The Japanese commander of the striking force had orders to return to Japan without executing the attack, if his force was detected prior to Dec. 6. If the Japanese force was detected on Dec. 6, the Japanese commander was to use his judgment whether to attack.

Of extreme significance were two messages of Dec. 6 (not translated until Dec. 8) from Japanese agents at Hawaii to Tokyo, one of which read as follows:

Re the last part of your No. 123.

1. On the American continent in October the Army began training barrage balloon troops at Camp Davis, North Carolina. Not only have they ordered four or five hundred balloons, but it is understood that they are considering the use of these balloons in the defense of Hawaii and Panama. Insofar as Hawaii is concerned, though investigations have been made in the neighborhood of Pearl Harbor, they have not set up mooring equipment, nor have they selected the troops to man them. Furthermore, there is no indication that any training for the maintenance of balloons is being undertaken. At the present time there are no signs of barrage balloon equipment. In addition, it is difficult to imagine that they have actually any. However, even though they have actually made preparations, because they must control the air over the water and land runways of the airports in the vicinity of Pearl Harbor, Hickam, Ford and Ewa, there are limits in the balloon defense of Pearl Harbor. I imagine that in all probability there is considerable opportunity left to take advantage for a surprise attack against these places.

2. In my opinion the battleships do not have torpedo nets. The details are not known. I will report the results of my investigation.

The other message of Dec. 6 from Honolulu to Tokyo reported, among other things, "it appears that no air reconnaissance is being conducted by the fleet air arm."

The commanders at Hawaii were aware that the Japanese probably knew that U.S. forces were not alerted. It was a fair inference that if they had been fully alerted, and daily air reconnaissance had been made toward the north and northwest, the Japanese would have known it and might have recalled the attacking force.

The joint committee found that the most serious error of judgment on the part of Admiral Kimmel was in failing, after the warning messages of Nov. 27, to conduct daily long-range air or other reconnaissance to detect the approach of enemy forces. The plans for joint defense of Pearl Harbor against air raids provided that long-range air reconnaissance should be conducted by the navy, with its available patrol planes, but long-range army bombers would be made available to aid the navy patrol. In the week before the attack, only six serviceable army bombers were available. The fleet had between 60 and 70 patrol bombers. These were too few to cover the whole perimeter of 360°, but were enough to have covered a sector of 120° to the north and northwest, the area named by the Martin-Bellinger estimate as that from which an air raid was most

probable, and the area from which the attack did come. The existing plans in case of war with Japan contemplated use of the Pacific fleet for raids to the west on the Marshall Islands. Admiral Kimmel concluded that the wear and tear on his limited force of planes and crews from long-range reconnaissance around Hawaii would impair the fleet's capacity to carry out its missions to the west, and that the danger of an air raid on Pearl Harbor was not great enough to justify a reconnaissance even in the limited sector. The navy board exonerated Kimmel of blame for this decision. After Nov. 27, Kimmel and Short risked the safety of the fleet on their judgment that no air attack would be made.

The difference from a military point of view between the responsibilities of a commander in the field and those of the general staff at Washington was stated by Secretary of War Stimson in his review of the report of the army Pearl Harbor board. Referring to the Washington end, he said:

A keener and more imaginative appreciation on the part of some of the officers in the War and Navy Departments of the significance of some of the information might have led to a suspicion of an attack specifically on Pearl Harbor. I do not think that certain officers in the War Department functioned in these respects with sufficient skill.

In this connection, the marked distinction between the character of the responsibility resting on the war plans division and that reposing in General Short was expressed by Secretary Stimson as follows:

It must clearly be borne in mind that in November and December 1941 the responsibilities of the War Plans division covered many fields and many theaters. Their preoccupation with the theaters most likely to be threatened, such as the Philippines toward which the Japanese activities then appeared to be pointed, may be subject to criticism in the light of the subsequent disaster, but it is understandable. All signs pointed to an attack in that direction, and they were exercising particular care with respect to that theater. Their conduct must be viewed in an entirely different light from that of the theater commander, such as General Short, who was like a sentinel on post and whose attention and vigilance must be entirely concentrated on the single position which he has been chosen to defend and whose alertness must not be allowed to be distracted by consideration of other contingencies in respect to which he is not responsible.

Unity of Command.—The command responsibility at Hawaii was divided. Striking evidence of this was given to the Roberts commission.

General Short testified that under the agreed plan for joint defense it was the navy's duty to conduct long-distance air reconnaissance to detect approaching enemy forces, and he assumed Admiral Kimmel was doing that. To the inquiry whether he had asked Admiral Kimmel about it, he replied that he had not, as the latter would have "resented" such a question. Admiral Kimmel said he assumed the army was on the alert and that its radar detection apparatus was in operation. To the inquiry whether he had asked Short about that, he replied "it would not have set well" with General Short to be checked up on his operations.

Previous to the attack General Marshall had attempted, through the army and navy joint board, to bring about an agreement for unified command at U.S. outposts. Both branches of the service agreed that should be arranged, but they were unable to agree on a basis for deciding whether the commander at any place should be a naval or army officer. Brig. Gen. Leonard T. Gerow reported to General Marshall the failure of these negotiations; the matter was dropped. It became obvious later that the controversy should have been submitted to and settled by the

president, and unified command in U.S. outposts arranged, as was done too late, shortly after Dec. 7. Both Short and Kimmel believed that an air raid would not be attempted. Their opinions reacted on each other. If one officer had been in command and solely responsible, he might have feared to risk omitting precautions against a raid.

Organization of Intelligence.—The joint committee pointed out the inadequate organization of U.S. intelligence services as a contributory cause of the disaster. Information was collected by the state department, the office of naval intelligence, the military intelligence division of the war department (G-2), the Federal Bureau of Investigation and other agencies, but there was no central office in which all this information could be evaluated by an adequate force of gifted and well trained officers. If in such an office all available information had been marshalled and weighed, and all intercepted Japanese messages had been promptly decoded, the danger of an air raid on Pearl Harbor might have been realized.

The Short Reply.—On receipt of the warning message of Nov. 27 from Marshall, General Short had immediately replied, as noted above, that his command had been "alerted to prevent sabotage. Liaison with navy."

His main defense was that this disclosed an alert against sabotage only, and in the absence of further instructions he had a right to assume that his action was approved. General Gerow at Washington made the mistake of assuming that Short's report was in reply to a message from Gen. Sherman Miles, head of army intelligence, warning the Hawaiian command of danger from sabotage. The record indicated that Col. Charles W. Bundy, assistant chief of the war plans division, considered that the message of Nov. 27 ordered Short to conduct a reconnaissance; that the only reconnaissance by the army possible from an island was by air; that the agreement for a joint defense against an air attack called for action by the navy to aid which the army was to furnish such long-range bombers as were available, and therefore the phrase "liaison with navy" meant that Short was doing more than alert against sabotage. The Short reply was ambiguous, and the war plans division was criticized by the joint committee for not making sure that Short was alerted to an attack from without.

Bombing Plot Message.—In Sept. 1941 a message from Japan to its consulate in Hawaii was intercepted and decoded at Washington. It read as follows:

Strictly secret.

Henceforth, we would like to have you make reports concerning vessels along the following lines insofar as possible:

1. The waters (of Pearl Harbor) are to be divided roughly into five subareas. (We have no objections to your abbreviating as much as you like.)

Area A. Waters between Ford Island and the Arsenal.

Area B. Waters adjacent to the Island south and west of Ford Island. (This area is on the opposite side of the island from Area A.)

Area C. East Loch.

Area D. Middle Loch.

Area E. West Loch and the communicating water routes.

2. With regard to warships and aircraft carriers, we would like to have you report on those at anchor (these are not so important) tied up at wharves, buoys, and in docks. (Designate types and classes briefly. If possible we would like to have you make mention of the fact when there are two or more vessels along side the same wharf.)

Other intercepted messages containing reports on ships in Pearl Harbor were sent from Tokyo to Hawaii Nov. 15, 20 and 29, and were translated Dec. 3, 4 and 5, respectively.

Admiral Kimmel placed stress on the fact that he was not furnished with copies, and that the messages called for information only useful for an air raid on the fleet.

Officers at Washington who saw the messages did not so construe them, and were so little impressed by the messages that they had forgotten having seen them. They testified that they were similar to many others in which the Japanese asked for information as to ship movements and location of vessels at many other points. They were laid aside as of no special significance. The joint committee found that the Hawaiian commanders should have been informed of the contents of these messages.

The Last Hours.—As Dec. 7 neared, some incidents occurred which, if properly evaluated, gave what in legal parlance is known as a "last clear chance" to avert or minimize the disaster.

A radio direction finding service was in operation in the Pacific area, which could locate Japanese war vessels whose radio call numbers were known, and which sent out radio messages. Frequent reports of location of Japanese vessels were available to Admiral Kimmel at Hawaii. The Japanese had eight carriers. After Nov. 25 (the day the task force, including six carriers, left Japan for Hawaii) the direction finding system lost track of several carriers. On Dec. 2, Lieutenant Commander Edwin T. Layton, of Kimmel's staff, reported this to Admiral Kimmel in person. The alternative assumptions were that the carriers were either in home ports, or at sea on a secret expedition, maintaining radio silence. Layton testified that Admiral Kimmel then said: "Do you mean to say that they could be rounding Diamond Head and you wouldn't know it?", and Layton replied, "I hoped they would be sighted before now." The radio direction finding reports of Dec. 4, 5 and 6 reiterated the statement that the carriers could not be located.

On Dec. 6 the Federal Bureau of Investigation at Honolulu intercepted a transpacific radio telephone conversation between a person in Japan and one Mori, a man in Hawaii suspected of being a Japanese agent. It indicated that Japan wanted information as to whether daily flights of large planes were being made from Hawaii, whether search lights were being used and as to the number of ships in Pearl Harbor. Other parts of the conversation contained words having a hidden meaning. The Federal Bureau of Investigation agent was alarmed at what he considered the military implication of the message with respect to Pearl Harbor, and Lt. Col. George W. Bicknell (assistant G-2) agreed with him. Bicknell insisted on taking the message immediately to General Short, who delayed an evening dinner engagement to receive it. General Short informed Bicknell that the latter was too "intelligence conscious" and that the message was "nothing to be excited about."

The Martin-Bellinger report had suggested that the presence of Japanese submarines near Pearl Harbor would indicate the approach of a raiding force with aircraft carriers. On Dec. 7, at 3:42 A.M., a submarine periscope was reported sighted off the entrance buoys near Pearl Harbor. At 6:30 A.M., a small submarine was observed off Pearl Harbor. It was fired on, and a navy plane dropped depth charges and sank it. These facts were reported to shore stations, and news of the sinking reached Admiral Kimmel's duty officer at 7:15 A.M., and Admiral Kimmel at 7:30. Previous unverified reports of the presence of Japanese submarines had been received, and verification of these reports of Dec. 7 was awaited. No alert followed, because the attack began before the reports were verified.

The army radar detection service had been operating only on a training basis from 4:00 to 7:00 A.M. Sundays.

Five mobile stations were available. They were closed down at 7:00 A.M., but at one station two enlisted men continued operation. At 7:02 the instruments indicated the approach of a large fleet of planes from the north. That fact was reported to the central office, where only a junior lieutenant remained on duty, and he instructed the enlisted men to "forget it." This information was not even used to locate the escaping Japanese carriers.

Meanwhile at Washington, on Dec. 6, the navy department began intercepting a long code message from Japan to its ambassador at Washington for delivery to Secretary of State Hull. The message was in 14 parts. By 10:00 P.M., the first 13 parts had been intercepted and decoded, and copies were delivered to the president, to Secretary Knox and officers of naval intelligence. These 13 parts discussed the American statement presented by Hull on Nov. 26. Their tone indicated that Hull's proposals were not acceptable to Japan. They tended to confirm, but added little to, the previous information that negotiations were ended and that war was imminent. Nothing in them pointed at Pearl Harbor as a target for attack. After midnight the 14th part and a supplemental message were intercepted, the decoding and translation of which were not completed until 8:00 A.M. Dec. 7th. The 14th part stated that negotiations between the 2 governments were at an end. The supplemental message was an instruction to the Japanese ambassador to deliver the message to the secretary of state at 1:00 P.M., Washington time, Sunday, Dec. 7. The staff officers on duty at the war and navy departments made no special effort immediately to deliver these messages to Marshall or Stark. Copies of the 14th part and the 1:00 P.M. message reached the White House at about 10:30 A.M., and reached Admiral Stark, chief of naval operations, about the same time. Duty officers at the war department telephoned General Marshall's home, but he was riding horseback, and no attempt was then made to locate him. He arrived at the war-department about 11:30 A.M., and then received copies. Up to that time no one seems to have caught the significance of the 1:00 P.M. delivery message. One P.M. at Washington was about 7:30 A.M. at Honolulu. General Marshall immediately prepared a message to General Short and other outpost commanders, as follows:

The Japanese are presenting at 1 P.M. eastern standard time today, what amounts to an ultimatum. Also they are under orders to destroy their code machine immediately. Just what significance the hour set may have we do not know, but be on the alert accordingly. Inform naval authorities of this communication.

The message was encoded and delivered to the message centre for transmission at 12:01 P.M. (6:31 A.M. Honolulu time). Because of static the army radio could not contact Pearl Harbor, and resort was had to Western Union and R.C.A., and the message arrived at the Honolulu office of R.C.A. at 7:33 A.M. Hawaiian time. Before delivery to General Short the attack had begun. Because of the state of unreadiness at Pearl Harbor, the delivery of that warning shortly before the attack could only have mitigated the damage. So the blow fell.

(See also HAWAII; JAPAN; UNITED STATES; WORLD WAR II.)

(S. RN.; W. D. ML.)

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Pears

See FRUIT.

Peas, Green

See VEGETABLES.

Peat

The use of peat as a fuel replacing scarce coal supplies led to outputs running into millions of tons in U.S.S.R., Eire and Denmark; outputs ranging from 100,000 tons to 1,000,000 tons were made in Finland, the Netherlands, Norway, Sweden and Switzerland, with smaller amounts in several other European countries. In the United States peat continued to be used chiefly as a soil conditioner. Production was 51,223 short tons in 1937, and imports 86,871. As shipment from Europe became impossible during World War II, U.S. production increased, supplemented by imports from Canada. Output rose to 86,503 tons in 1941, but declined to 57,987 tons in 1944, increasing to 78,272 tons in 1945. At the same time, imports declined to 21,689 tons in 1940, and increased to 77,673 tons in 1945.

Canadian production included a few hundred tons for fuel, but the bulk of the output continued to be peat moss, much of it exported to the United States. Production increased from 17,217 tons in 1940 to 83,974 tons in 1945.

(G. A. Ro.)

Pecans

See NUTS.

Peek, George Nelson

Peek (1873-1943), U.S. industrialist and government official, was born Nov. 19, 1873, in Polo, Ill. After graduating from the Oregon (Ill.) high school in 1891, he attended Northwestern university. He entered private industry in 1893 and served as executive of several agricultural implement companies until 1923. In 1918 he was with the War Industries board as commissioner of finished products. The following year he acted as chairman of the industrial board in the U.S. department of commerce. As president of the American Council of Agriculture, 1925-28, Peek gained a knowledge of farm problems which proved valuable when he was appointed administrator for the newly formed Agricultural Adjustment administration in May 1933. In 1934-35 he acted as special adviser on foreign trade to President Roosevelt while serving as head of the Export-Import Bank of Washington. He died near San Diego, Calif., on Dec. 17, 1943.

Peel Commission

See PALESTINE.

Peiping

After the removal of China's capital from Peking (officially renamed Peiping) to Nanking in 1928, Peiping became the principal cultural and residential centre in North China. The population was estimated at 1,550,561 in March 1945.

On July 7, 1937, Japanese troops opened fire on the

Chinese army at Lukouchiao (Marco Polo bridge) in the suburbs of Peiping. This incident marked the beginning of the second war between China and Japan.

The Chinese army evacuated Peiping on July 28–29 1937. The Japanese, on Dec. 14 of the same year, inaugurated in Peiping a puppet regime known as the "Provisional Government of the Republic of China." After the establishment of the puppet regime in Nanking in March 1940, the Japanese-sponsored regime in Peiping came to be known as the "North China Political Council." From the time of its fall until the end of World War II in Sept. 1945, Peiping was one of the main centres of Japanese activities in North China, the city being well served with railways and highways linking it with Manchuria, Mongolia, Nanking, Hankow and Shanghai.

During the Japanese occupation, all schools and universities operated by the Chinese government were either suspended or removed. The American missionary-supported Yenching university remained, but was also forced to close down after Pearl Harbor. Students were compelled to attend schools and universities operated by the Japanese-sponsored regime. Many university campuses were requisitioned by the Japanese army.

Peiping did not sustain direct war damages, but it was sadly neglected. During the war, the population of Peiping increased considerably. This increase was largely due to the lack of law and order in the countryside, resulting in acute food and fuel shortages.

On Oct. 10, 1945 (China's national anniversary day), the Japanese garrison in Peiping formally surrendered to General Sun Lien-chung of the Chinese army in front of historic Tai Ho Tien, the main imperial palace. On Oct. 13, the Chinese army took over the garrison of the city. Peiping then resumed its former status as a municipality under the central government. It also became a key political centre in North China, especially with regard to the conflict of the Chinese government with the Communists.

(C. CN.)

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Pemba

See BRITISH EAST AFRICA.

Penicillin

See AGRICULTURAL RESEARCH ADMINISTRATION; CHEMISTRY; CHEMOTHERAPY; CHEMURGY; DERMATOLOGY; EYE, DISEASES OF; HEART AND HEART DISEASES; INDUSTRIAL RESEARCH; MEDICINE; MILITARY MEDICINE; PNEUMONIA; SURGERY; UROLOGY.

Pennsylvania

A middle Atlantic state, Pennsylvania is one of the original 13 states of the union, popularly known as the "Keystone state." Area, 45,333 sq.mi., including 288 sq.mi. of inland water. Population (1940) 9,900,180, of whom 8,453,729 were native-born white, 973,260 foreign-born white and 470,172 Negroes. The urban population in 1940 numbered 6,586,877 and the rural 3,313,303. Capital, Harrisburg (83,893); other cities: Philadelphia (1,931,334); Pittsburgh (671,659); Allentown (96,904); Wilkes-Barre (86,236). On July 1, 1944, the bureau of census estimated the state's population at 9,247,088.

The first Pennsylvania legislature to be controlled by Democrats in over 90 years met early in 1937, and presented the governor with 137 bills, of which 17 were vetoed. Those approved featured labour legislation, in-

cluding measures providing for a 44-hour week; establishing a labour relations board; limiting the use of injunctions in labour disputes; upholding the right of organization; and providing for minimum wages for women and minors. These statutes were intended to prevent repetition of the serious situation resulting from strikes during the year. Other labour provisions included bills requiring full railroad crews and regulating industrial work in homes.

The most perplexing problem faced by the legislators in 1937 was the bootlegging of coal from abandoned mines, which had reached such proportions that federal intervention seemed imminent. A state commission was established to study the problem, but at year's end the proper solution was still debated. Other significant measures in 1937 included a bill reorganizing relief administration by abolishing local poor boards and establishing a board of public assistance to operate through two city and 66 county districts; provision for a toll highway between Harrisburg and Pittsburgh; an act granting the state wide powers of liquor control. Of five constitutional amendments submitted to the voters in Nov. 1937, only the one legalizing pensions to mothers and to the blind was approved. The electorate refused to uphold a state income and inheritance tax and rejected consolidation of the Philadelphia city and county governments, although even the Republican city chairman supported the administration's proposal.

In the November election of 1938, the Republicans carried the state. Judge Arthur H. James of the superior court received more than 2,000,000 votes for governor, defeating his Democratic opponent by 300,000 votes. His associates on the ticket were also elected, including James J. Davis, a candidate to succeed himself as U.S. senator. The Democrats had controlled the general assembly with a majority of 100 in the house and 18 in the senate. This was changed to a Republican majority of 50 in the house. The Democrats still had a majority of two in the senate, but later a holdover independent Democrat announced that he would vote Republican, thus creating potential tie votes in the senate. Marion D. Patterson was elected justice of the supreme court. William H. Keller, presiding judge of the superior court, and associate judges Thomas J. Baldrige and William E. Hirt, were re-elected. All were Republicans.

During a special session of the general assembly, which began on July 25, 1938, and continued until Nov. 30, 38 bills were passed including one transferring to state control the hospitals for mental diseases in 12 counties, another for the expenditure by the state authority of \$93,000,000 for school buildings and a third making the state responsible for the medical care of those on relief. It appropriated \$25,000,000 for general relief and \$3,474,925 for other purposes.

The general assembly created a department of commerce in 1939, and Richard P. Brown was appointed as its first head. A new law of 1939 directed that aliens more than 18 years old should register annually with the department of labour and industry and should carry registration cards to be shown on demand of the police. The validity of the law was contested in the U.S. courts on the ground that the subject was outside the jurisdiction of a state and late in Nov. 1939, the federal district court declared the act invalid for this reason. Among acts dealing with labour was one which empowered the courts to issue injunctions against sit-down strikers and provided that employers as well as employees might petition the Labor Relations board for redress of grievances. The right to reinstatement

or to payment of wages during strike periods was denied to workers found guilty of unfair practices; engaging in a sit-down strike was defined as an unfair practice. The anti-injunction law was further amended to permit the issue of a restraining order when there was violation of a valid agreement or when employees engaged in practices intended to coerce an employer. The act of a previous legislature intended to prevent a grand jury investigation of charges against executive officers of the state was repealed. The investigation which this law was intended to stop was continued and several officials were indicted.

The validity of the graduated chain stores tax, levied by a previous legislature, was contested in court by the companies involved. The tax varied from \$100 to \$500 on each store. When the case reached the supreme court it was held that the law violated the provision of the state constitution which directed that taxes should be uniform on the same class of property.

In the 1940 presidential election, on Nov. 5, the Democrats carried the state, giving President Roosevelt the state's 36 electoral votes. Roosevelt received 2,171,035 votes and Willkie 1,889,848. Joseph F. Guffey was re-elected to the U.S. senate, and 19 Democrats were elected to the national house of representatives. The Republicans elected 15. The Democrats elected G. Harold Wagner as state treasurer and F. Clair Ross as auditor general. The Republicans retained control of the state senate with 32 members to 18 Democrats, but the latter elected 126 members of the house to 82 by the Republicans. The question whether motion picture theatres should be operated on Sunday was submitted to the voters, and 87 communities voted against Sunday opening; 47 in which the theatres had been closed voted to permit their operation.

The general assembly met in special session on May 6, 1940, primarily to appropriate \$71,850,000 for unemployment relief. Among other measures approved were one authorizing the extension of the Harrisburg-Pittsburgh superhighway from Carlisle to Philadelphia; another appropriating \$1,000,000 for relief of distressed school districts; an increase from 16 to 18 years in the age limit of those eligible for aid as dependent children; an amendment to the election code permitting a special election for filling vacancies in the general assembly during a recess, and one exempting employers from payment of insurance taxes on salaries over \$3,000. The state supreme court decided that the Fair Sales act of 1937 was invalid as its second section, which forbade sale of merchandise at less than cost, violated the 14th amendment of the U.S. constitution. In January the governor appointed a committee to solve the problems of the mining industry. It agreed on a voluntary stabilizing program, allocating the amount of anthracite to be mined from week to week.

The biennial session of the general assembly met in Jan. 1941. One of the first acts provided for a state defense council. Under authority of the act the organization of a home defense guard of 5,000 was ordered. A state housing board was also created. The state was authorized to cooperate with other states in the regulation of oil production. Retail and wholesale merchants were forbidden to sell goods at less than cost with a few exceptions. Re-employment of state employees called into military service was guaranteed with half pay up to \$2,000 a year while in service. Public employment and participation in elections was forbidden to all who aimed at the overthrow of the state or federal government by force. A civil service board was created in the departments of public assistance, unem-

ployment compensation and liquor control. Under the congressional reapportionment act, the state's representation was reduced from 34 to 33. The validity of the state labour law recognizing the right of workers to organize and bargain collectively was sustained by the state supreme court.

In the Nov. 1941 election, the Republicans elected their candidates to the supreme and superior courts. They also elected 36 county judges to 9 elected by the Democrats, and 10 mayors as against 9 by Democrats. The Republicans were also victorious in the special election in the 15th congressional district.

In a special session in Feb. 1942, the general assembly passed a bill abolishing two congressional districts and providing for the election of two representatives-at-large on a state-wide ticket. In November the Republicans elected Edward Martin as governor, John C. Bell, Jr., as lieutenant governor and William S. Livengood as secretary of internal affairs; also a justice of the supreme court and a judge of the superior court. They also retained control of the senate and regained control of the house, which they had lost in 1940, and elected 19 of the 33 members of the national house of representatives including the representatives-at-large. The principal state officers in 1942 were: Arthur H. James, governor; Samuel S. Lewis, lieutenant governor; Claude T. Reno, attorney general; G. Harold Wagner, treasurer; and William I. Schaffer, chief justice.

The 1943 biennial session of the general assembly began on Jan. 5 and continued until May 9, passing many important bills. It reduced taxation by \$45,000,000 in spite of increased appropriations for welfare and education and appropriations to the police pension fund. It suspended the operation of civil service regulations in state departments for the duration of the war, transferred 400 jobs from the Democratic-controlled attorney general's office to the Republican secretary of revenue, permitted the employment of school children 14 years old on farms in case of a shortage of labour, authorized the state council of defense to aid in the elimination of black markets, made an estimated reduction of \$3,000,000 in automobile licence fees, empowered the governor to suspend laws when the legislature was not in session on the request of the federal government, created a postwar planning commission and increased from 44 to 48 hours a week the permissible time for the employment of women and children in war industries. Principal officers in 1943 were: Edward Martin, governor; James H. Duff, attorney general; G. Harold Wagner, treasurer; George W. Maxey, chief justice.

(G. W. Do.; X.)

A special session of the assembly met on May 1, 1944, to amend the military ballot law. In the shortest session on record (five days), the most liberal soldier vote legislation in the country was passed, requiring that a ballot be sent to every qualified voter, even if not registered, who was serving in the armed forces, Red Cross, or similar organizations. In the general election, 255,226 military ballots were cast. Franklin D. Roosevelt carried the state in the general election by 1,940,479 votes to Thomas E. Dewey's 1,835,048. The Republicans, however, retained control of the general assembly, holding the senate by 32-18 and the house by 109-99. Principal officers in 1944 included: Edward Martin, governor; John C. Bell, lieutenant governor; James H. Duff, attorney general; William S. Livengood, Jr., secretary of internal affairs; F. Clair Ross, auditor general; G. Harold Wagner, treasurer; George W. Maxey, chief justice; Francis D. Haas, superintendent of public instruction.

Among the achievements of the state government in

1945 was the passage of various acts implementing the conservation of the state's resources and the development of a postwar program of public works. Appropriations were granted for the development and protection of the water, mineral, soil and forest resources of the state and for the improvement of state parks. An extensive program of highway and institutional construction was also authorized. Appropriations were made for the preparation of plans for local public works and for planning and construction of airports. The legislature granted public school teachers a permanent increase in pay, making the state's salary schedule the highest of any state and set up a new system of physical examinations for school children. Unemployment compensation benefits were liberalized, while contributions for compensation were reduced for those whose employment records were stable.

By 1945, nearly 1,200,000 Pennsylvanians had seen military service, almost one-eighth of the total population. Estimated casualties of World War II from the state were 80,000, including 20,000 killed. During the war period, the state produced more than 31% of the nation's coal, coke and steel requirements; it stood seventh in over-all war production, sixth in communication equipment, fourth in shipbuilding, third in ordnance and first in expansion of industrial facilities. The civilian defense corps organized April 23, 1941, which at one time included

1,600,000 citizens, was demobilized Oct. 15. New officers in the posts of auditor general and treasurer of the state were G. Harold Wagner and Ramsey S. Black.

The election of Nov. 1946 gave the Republicans a clean sweep by the largest majorities in 20 years. Gov. Martin captured the seat in the U.S. senate held by Joseph F. Guffey.

James H. Duff, attorney general, was elected governor, while Brig. Gen. Daniel Strickler was chosen lieutenant gov., and William S. Livengood, Jr., was named to his third term as secretary of internal affairs. The Republicans elected 28 of the state's 33 congressmen, gaining nine seats

Pennsylvania: Statistical Data

Table I.—Education (Public)

	1938	1940	1942	1943	1944
Elementary school pupils	1,448,484	1,154,465	1,088,591	1,106,275	962,227
High school pupils	496,504	701,065	90,047	676,637	575,325
Elementary teachers	38,297	35,798	-	36,109	35,622
High school teachers	21,307	23,525	-	22,562	24,525

Table II.—Public Welfare

(Money figures in thousands of dollars)

	1938	1940	1941	1942	1944 (est.)	1945 (est.)
Cases on general relief	236,937	183,601	123,071	-	-	-
Cost of general relief	\$5,762	\$4,760	\$2,378	-	-	-
Recipients of old-age pensions	88,342	98,218	103,567	98,808	85,000	83,000
Dependent children receiving aid	44,876	86,630	158,348	168,552	90,000	23,000
Blind receiving aid	12,028	12,962	13,656	13,885	13,000	13,000

Table III.—Communications

(Money figures in thousands of dollars)

	1938	1939	1940	1941	1943	1944
Highway mileage	40,514	40,512	40,521	40,510	40,510	40,510
Expenditures on highways	\$93,640	\$65,685	\$91,364	\$67,659	-	-
Railroad mileage	10,617	10,428	-	11,966	11,950	11,950

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1938	1939	1942	1944	1945
State revenue	\$378,072	\$422,650	\$390,317	-	-	-
State expenditure	\$273,682	\$366,422	\$353,224	-	-	-
State gross debt	\$134,515	-	-	-	\$94,329	\$87,688
Number of banks	1,122	1,113	1,103	1,077	1,044	1,040
Total bank deposits	\$5,192,500	\$5,071,800	\$5,417,000	\$6,450,893	\$7,613,097	\$8,917,800
Number of national banks	697	696	693	681	665	665
Deposits of national banks	\$2,586,717	\$2,688,462	\$3,038,927	\$3,474,266	\$3,479,228	\$4,035,198

Table V.—Agriculture

(All figures in thousands)

	1937	1939	1940	1943	1944	1945
Income from crops and livestock	\$284,500	\$261,037	\$275,525	-	-	-
Income from government payments	2,500	5,723	6,679	10,472	29,508	-
Leading crops (bu.):						
Apples	11,567	10,998	9,100	5,070	9,100	2,470
Barley	1,827	3,658	4,030	2,750	2,632	3,150
Buckwheat	-	-	-	2,508	2,940	2,016
Corn	62,928	58,140	53,640	49,172	53,580	59,576
Hay (tons)	3,251	2,658	3,238	3,399	3,216	3,444
Oats	24,705	26,274	31,080	14,878	23,912	24,583
Potatoes	25,215	22,440	24,570	18,656	19,140	16,724
Tobacco (lb.)	28,990	45,347	49,590	40,014	52,893	52,724
Wheat	23,573	19,421	18,789	13,435	20,288	20,194

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1940	1942	1943
Wage earners	954,340	858,296	1,419,051	-	-
Wages paid	\$1,176,957	\$1,003,349	\$1,940,046	-	-
Value of products	6,032,083	5,475,925	6,901,966	\$11,374,420	\$13,263,393
Leading manufactured products (value):					
Metals	3,058,279	2,944,848	-	6,143,212	7,093,399
Textiles	819,403	795,457	-	1,187,789	1,302,290
Food	770,319	740,902	-	1,037,052	1,224,878
Chemicals	499,396	518,062	-	716,571	878,796
Paper and printing	350,437	372,074	-	452,712	501,019
Leather	175,288	174,964	-	284,291	315,582
Tobacco	85,513	92,272	-	106,356	120,841

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1938	1939	1940	1943	1944
Value of mineral production	\$599,817	\$472,773	\$532,356	-	-	-
Leading products (value):						
Coal, bituminous	228,665	160,965	188,990	\$237,333	\$397,634	\$464,256
Coal, anthracite	197,599	180,600	187,175	205,490	306,816	354,583
Iron, pig	239,839	101,267	186,303	282,667	399,568	397,396
Coke	65,841	32,016	49,016	-	-	-
Petroleum	49,300	32,760	36,200	39,700	46,960	46,600
Natural gas	41,842	29,544	35,268	41,733	45,272	45,080
Cement	31,918	28,243	34,333	38,351	27,907	20,690
Stone	17,251	13,045	16,907	19,855	23,566	22,516

in the U.S. house of representatives, and retained control of both houses of the general assembly. (E. Mn.; X.)

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Pension, Old-Age

See LAW; RELIEF; SOCIAL SECURITY. See also under various states.

Pensions, Army and Navy (U.S.)*See VETERANS' ADMINISTRATION.***Pensions, War (British and European)**

The present article deals with war pensions in Great Britain, several of the principal European countries and the British Commonwealth. For such pensions in the United States *see VETERANS' ADMINISTRATION.*

Great Britain.—The ministry of pensions was set up by act of parliament in 1917 and made responsible for the administration of war pensions and the provision of treatment for disablement resulting from war service. During the immediately succeeding years many changes and improvements were made in the war pensions code but thereafter the position was, in the main, stabilized until the outbreak of World War II.

In Sept. 1939 the ministry of pensions became responsible for the award of compensation to members of the armed forces, to merchant seamen and to the civil population generally for disablement or death suffered in the new war. The initial provisions for members of armed forces followed broadly those of World War I, and compensation remained dependent on the requirement of causal connection between disablement or death and war service. The rates were about 75% of those fixed in 1919, reflecting the fall in the cost of living. A scheme was introduced to cover the death or disablement of officers and men of the merchant navy and fishing fleets through war injuries resulting from enemy action while on sea-going service.

In 1942 the scheme was widened to cover certain other injuries at sea resulting from substantially increased risks arising from war conditions; *e.g.*, sailing in convoy, the absence of navigational aids and warnings or the carriage of unsuitable cargo. The rates of compensation took account of rank and corresponded to those paid to the royal navy. Other schemes provided compensation for disablement or death through war causes of Indian and Chinese seamen on British ships. Provision was made for the payment of compensation for civilians disabled or killed as a result of injuries caused by enemy attack or sustained in the course of their duties as members of civil defense organizations. The rates of pensions laid down were broadly those for private soldiers.

On the outbreak of World War II the pension rates for women were about two-thirds of those for men. In 1941 a select committee of the house of commons recommended that this differentiation be abandoned. Thereafter men and women covered by the civilians' scheme received the same rates of pensions, and this provision was extended to the basic ranks in the armed forces. In 1943 important changes were introduced. World War II pension rates, already increased from time to time, were brought up to those fixed in 1919. The pension instruments were amended to make it clear that the onus of proving connection between disablement or death and war service did not rest with the applicant, who was entitled to certain presumptions in his favour, and that the benefit of any reasonable doubt should be given to him. A special allowance was introduced for pensioners of both wars so seriously disabled as to be virtually unemployable, with allowances for wives and children even though not otherwise eligible because marriage had taken place after disablement. An allowance was also introduced to supplement the pensions of widows with children where a rent of more than 8s. (*c.* \$1.60) weekly was paid. In the same

year the Pensions Appeal Tribunals act was passed. This provided for the setting up of independent tribunals to hear appeals against adverse entitlement decisions of the ministry and against the ministry's assessment of the extent of disablement. The hearing of entitlement appeals began late in 1943 and of assessment appeals at the end of 1946.

Further improvements were announced in 1945 and 1946, the most important being the abandonment of the principle which had previously precluded payment generally of allowances in respect of a wife and family, or pension to a widow, unless marriage took place before the disablement was sustained. The rates of disablement pension, the allowance for the unemployable pensioner and the widow's maximum rent allowance were all increased. A new special hardship allowance was introduced for the partially disabled pensioner of World War II who, though not unemployable, was prevented by his disablement from following his old occupation or one of equivalent standard.

The more important rates of pension and allowances applying to both wars are shown below.

Disablement.—This was assessed by comparison with a normal healthy person of the same age and without regard to earnings: private soldier (100% disablement) £2 5s.; allowance for wife 10s.; allowance for each child 7s.6d. Awards for lesser degrees of disablement in steps of 10% down to 20% were proportionate. Disablement below 20% was compensated by a lump sum payable either outright or in instalments. Where disablement was so severe as to prevent restoration of any working capacity an "unemployable" supplement of £1 weekly was paid and the allowance for a dependent wife was increased to 16s. A pensioner disabled 100% who needed constant attendance could have an additional allowance of from 10s. to £2 weekly. Thus, in a case of very severe disablement a married private soldier with 2 children could receive £6 16s. weekly. Disablement pensions and allowances were not subject to income tax.

Death.—Widow of private soldier: if more than 40, or in receipt of an allowance for a child or infirm £1 15s.; allowance for each child 11s.; rent allowance up to 15s.; if less than 40 and childless and not infirm £1; motherless child less than 15, 13s.6d.; motherless child of 15 or more £1; motherless child of 18 or more and an invalid £1 6s.

Parents.—Pensions were based on need and on the expectation of the support the deceased would have given had he survived. In the case of officers the maximum weekly rates of pension were £1 16s.6d. and £2 6s. for one and two parents respectively. The corresponding rates for other ranks were £1 7s.6d. and £2.

Disablement and widows' pensions varied according to rank. The 100% disablement rate for a junior officer was £4 1s. weekly, wife's allowance 14s. and child's allowance 11s.6d. Rates for officers' widows more than 40, or in receipt of an allowance for a child or infirm were from £2 18s. weekly with 14s. for each child but no rent allowance. Allowances for children normally ceased at 16. They could be extended beyond that age, *e.g.*, where the child was a student or an invalid. In addition, an allowance could be given under certain conditions for the education of a child of a disabled or deceased person. The maximum for each child was £1 10s. a week.

By March 31, 1946, £1,750,000 had been spent on pensions in respect of World War I. At that date the annual expenditure amounted to £40,000,000. For World War II the comparable figures at the same date were £90,000,000

and £35,000,000. On June 30, 1946, there were still about 586,000 pensioners from World War I and the numbers for World War II had reached 476,000, a total which would have increased over the next year or so.

The special arrangements for World War II included the organization by the ministry of health of an extensive emergency hospital service and of special centres for the treatment of certain disabilities, including neuroses, peripheral nerve injuries and chest, spinal and head injuries. Much attention was paid to orthopaedic surgery and to rehabilitation, in which occupational and remedial therapy played an important part.

The ministry of pensions had under direct control, in 1946, 12 hospitals and a number of out-patient clinics and also had arrangements with hospitals throughout the country for the treatment of the war disabled at the expense of the ministry. An important side of the ministry's work was the provision of artificial limbs and training in their use, and for this purpose 17 limb-fitting centres were maintained. Arrangements had also been made for the supply of surgical appliances and of hand and motor-propelled chairs. Artificial eyes were manufactured at the ministry's optical appliances depot, a feature being the development of plastic artificial eyes. The depot also supplied spectacles where required as the result of war disablement. Under ministry auspices considerable advances had been made, and research continued, in the design and construction of artificial limbs, in plastic surgery for facial and jaw injuries and in the treatment of serious spinal injuries. The ministry also co-operated closely with the ministry of labour and national service to ensure that the war disabled who could not resume their old occupations, but who were not incapable of work, were given suitable training and placed in employment. (W. Pc.)

Australia.—Under the provisions of the Australian Soldiers Repatriation act of 1920-46, the Australian government paid war pensions in cases of incapacity and death arising from service with the Australian forces during either World War I or World War II. The minimum basic rate was £A5 a fortnight, and the maximum £A6 16s. a fortnight. In addition there were special provisions for blinded servicemen and those with amputated limbs or, in some other way, totally incapacitated for life; these received a pension of £A9 12s. a fortnight and an assistance allowance of £A2 8s. a fortnight. The commonwealth also provided free medical treatment for war disabilities and surgical and hearing aids. The headquarters of the repatriation committee was established in Melbourne, with a branch in each state, in charge of a deputy committee of repatriation. At the end of June 1945 there were 281,079 pensioners receiving a total of £A11,728,864 a year in war pensions.

Canada.—Under the provisions of the Pensions act of 1927 as amended by later statutes up to 1946, war pensions were assessed and awarded by a Canadian Pension committee appointed by the governor-general in council. Disabilities were reckoned in terms of a percentage. The pension for a 100% disability for a single man below the rank of army captain or the equivalent was \$75 (Canadian) a month; these were scaled down per percentage. Pensions were paid at higher rates for the various ranks above captain. In addition, the usual allowances were made for wives and children. Canadian legislation anticipated that of other countries in making provision for wives who were married after the disability had been incurred. The pensioner was entitled to free medical treatment, artificial limbs and surgical appliances. Widows or nearest depend-

ent relatives of servicemen below the rank of army captain killed in active service received a maximum pension of \$60 a month; this was scaled down according to the amount of income from other sources. Higher rates were paid to widows and dependents of those above the rank of captain. In 1945 the annual cost to the government of pensions was \$37,140,669 arising from World War I and \$13,418,179 arising from World War II.

New Zealand.—In New Zealand, war pensions were regulated by the War Pensions act of 1943, which repealed all previous legislation and had subsequent amendments and by the War Pensions and Allowances (Mercantile Marine) act of 1940 (amended in 1943). They were awarded by a war pensions board. A totally disabled man was entitled to a pension of £NZ3 a week; in addition, he could claim allowances of £1 a week for a wife and 10s. for each child less than 16 years of age. The widow's pension was £2 a week with an allowance of £1 10s. a week for the first child and 10s. a week for each additional child. An "economic pension" (*i.e.*, a supplementary allowance to a totally disabled pensioner whose circumstances necessitated additional financial assistance) might also be granted. Servicemen received free medical care and hospital treatment. While in a hospital, they drew their pensions at the full disability rates. Men wearing artificial limbs or appliances might be granted a clothing allowance of up to £14 a year. An attendant's allowance of up to £5 a week might be given in cases where the services of an attendant were essential. In 1946, 54,219 war pensions were in force in New Zealand, of which 29,758 arose from World War II. The annual value of these was £4,200,000. New Zealand pensions were paid in any part of the world.

South Africa.—Under the South African Military Pensions acts of 1919 and 1942, as amended in 1946, pensions for volunteers wounded in World War II were assessed by a military pensions board. Disablements were reckoned in percentages; the pension for 100% disablement was £200 a year and pro rata down to 20%, when a gratuity was paid as a lump sum. The claimant in addition received allowances for a wife, boys up to 18 years of age, girls up to 21 and dependent relations; by later legislation, unmarried "wives" and illegitimate children could benefit from these. A pensioner was entitled to free treatment for his disablement and, if an in-patient, received a 100% allowance. Pensioners of 80% assessment or more might receive an attendant's allowance if considered necessary. Awards for female volunteers (except doctors) were slightly lower than those for men; however, they might claim additional allowances for disabilities which might hinder their chances of marriage. Widows of servicemen received a gratuity and a pension with allowances for dependent children; on remarriage the pension stopped, and a gratuity of £132 was paid down. (X.)

France.—In France the basic charter of military victims of World War II was the act of March 31, 1919. The text governing civilian war victims was the act of June 24, 1919, supplemented by that of May 20, 1946. The act of March 31, 1919, was based on a new conception of the "war victim." While former legislation considered disabilities only from the angle of the victim's fitness for further service with the armed forces, the new texts attempted to ensure reparation, as far as possible, for all physical injury resulting from the war, whether it affected the invalids themselves or their legal dependents (widows, orphans, parents). The principle was therefore one of

reparations, not of *ex gratis* state assistance. Henceforward, the war victim had legal rights. A second principle of French legislation in this field was the "objective" character of the reparation provided. It considered invalidity as such without regard to the special prejudice suffered by the victim by virtue of his occupation or profession.

Any invalidity was pensionable provided that it diminished the victim's validity by at least 10%. A medical board at which the pensioner might be assisted by a doctor of his choice assessed the degree of disability according to an invalidity table graded from 5% up to 100%.

A pension was permanent when the injury involved was incurable. Otherwise, the pension was temporary and became permanent only after three years in the case of injuries and nine years in the case of diseases. Pensions were revisable should the pensioner's condition deteriorate. A supplementary pension was granted to invalids suffering from several infirmities of which one only entailed total incapacity. Invalids not able to walk or live unaided were entitled to outside help and benefit by a supplementary pension. The highest invalidity brackets (from 85% upward) were entitled to supplementary indemnities whose rates varied with the nature and importance of the disability. Another indemnity was granted to severely maimed war victims (*grands mutilés*) who held the special card issued to those who had served at least six months' service at the front (*carte du combattant*). These indemnities were cumulative. The amount of the pension, at least for its basic rate, depended on the pensioner's military rank. Supplements were payable in respect of pensioners' children. In France no sliding scale for pensions was in force. From time to time pension rates were adjusted by law to keep them in line with the cost of living; the last revision of this kind in the decade 1937-46 was that of Aug. 10, 1946. Such increases as took place were uniformly based on the rate applicable to the private soldier. Pensioners were entitled to the payment of their medical and, as the case might be, their hospital expenses. If need be, the state assumed the cost of their professional re-education.

Although in matters of pensions the onus of proof, as in civil law, fell on the claimant, the legal texts, in certain cases, granted the claimant the benefit of what was called "presumption of origin." In such cases it was presumed that invalidity was the result of war service and the onus of disproof lay on the state. This applied to injuries or accidents suffered during war service. As regards diseases of which the origin was more difficult to detect, the "presumption of origin" applied only after a minimum period of service and ceased to apply after a given time following demobilization.

War widows benefited by pensions provided that they were married for a minimum period (two years). If the husband died from war injuries or the effects of a disease attributable to war service, the widow was entitled to a pension at what was called the "normal rate." That rate corresponded in principle to one-half the pension payable to a private soldier in respect of a 100% invalidity. If the death resulted from a disease or an accident unconnected with war service, the texts, allowing for the reduced physical resistance of former servicemen, entitled widows to a "reversionary" pension provided the husband's invalidity was assessed at a minimum of 60%. The reversionary pension was equal to two-thirds of the normal pension. If the pensioner left no widow or if she had remarried, his orphaned children enjoyed the same rights

in her place. Finally, the pensioner's parents might equally claim a pension; but their title, under the law, depended on their age and on a means test, the latter being provided by the income for which they were assessed under general income tax.

The act of March 31, 1919, set up special jurisdiction for contested claims. At its basis was a pension tribunal in each of France's 90 *départements*, presided over by a career judge and including a medical officer and a pensioner designated by one or other of the disabled servicemen's associations. Appeals from this tribunal went to a regional pensions tribunal, of which there was 1 for each of the 26 appeal court districts. The regional tribunal was exclusively composed of career judges. The whole appeal procedure was free of legal expense. In the last resort a special pensions commission attached to the *Conseil d'Etat*, France's highest administrative court, could be appealed to, but only as a court of cassation that adjudged on the legality of the decisions of the lower courts. Decisions held illegal returned to the lower courts for revision and re-judgment.

During the 1937-46 period these statutes were modified in details but not in principles. Among the modifications was the extension of time limits originally provided for the submission of pension claims so as to protect claimants whose infirmities revealed themselves belatedly. Another law provided remedies for the abusive grant of pensions and allowed for a revision of those granted to noncombatants. To avoid malpractices, a law, at the beginning of World War II, defined the conditions under which mobilized soldiers, in case of illness, could invoke "presumption of origin" for their claims. In 1941 the Vichy government further reduced the scope of this legal presumption. It also abolished, with effect for the future, the pension rights of remarried widows, their rights being vested in their children under age. Widows who remarried before this change in the law retained their pension.

After the liberation of France, a number of decrees made war pensions legislation applicable to two more categories of beneficiaries: first, the members of the French forces of the interior who fought in military formations; second, the members of the resistance movement who, while not belonging to regular military units, voluntarily participated in the defense of their country. Prisoners of war had already previously benefited by the act of March 31, 1919, being members of the armed forces.

The act of June 24, 1919, on civilian war victims, was no more than a specific and somewhat restricted variation of the act of March 31, 1919. It granted pension rights to civilians injured in the course of military operations, these terms understood *lato sensu*, as well as to victims of acts of violence committed by the enemy. The act of June 24, 1919, did not admit of the "presumption of origin." Moreover, it applied only to diseases contracted (*versus* aggravated) as a result of war, while in the case of soldiers aggravation was also considered.

A modification of this act became necessary in view of the way in which hostilities were conducted from 1939 to 1945 and the unexpectedly great number of civilian war victims. That was done by the act of May 20, 1946. It extended pension benefits to the victims of deportation and, more generally, of German atrocities.

Belgium.—Belgian legislation was very similar to the French. It included, however, one by no means negligible benefit for the pensioner, unprovided for under the French legislation, viz., a sliding scale adjusted to the cost of living index. If the cost-of-living rose, pensions were increased simultaneously and automatically without a spe-

cial law having to be passed for that purpose.

Netherlands.—Dutch pension legislation distinguished between career soldiers and drafted soldiers of the reserve. For the first group, the basic rate of invalidity pension was made equal to the maximum of their retirement pension: i.e., 70% of their active service pay. To obtain the amount of the invalidity pension the basic rate thus determined was multiplied by the percentage of disability. For soldiers of the reserve, the pension was calculated in such a way as to produce, in conjunction with the invalid's earnings, the amount of normal income corresponding to his occupation. In the case of widows and orphans, the same distinction applied as above. The widow of a regular soldier received half the amount of her husband's last service pay. For each child a further 10% was paid. In the case of a soldier of the reserve, the basic rate of the widow's pension depended on the lowest pay corresponding to the soldier's service rank. If that pay was lower than his earnings in civilian life, which was frequently the case, she received a supplementary allowance. In 1946 new measures were under consideration which would base the widow's pension not on the past actual earnings of the deceased, but on what those earnings would be at current rates.

The pension rights of parents were confined to the amount of support which the deceased son might have provided them in his lifetime.

In 1946 the extension of pension legislation to the survivors and dependents of members of the resistance movement was in preparation.

As in the Belgian case, increases in pensions were being made from time to time to adjust them to the rise in the cost of living.

U.S.S.R.—At the beginning of World War II the U.S.S.R. took measures to introduce war pensions legislation. Under the soviet system invalids were grouped into three categories: the totally disabled requiring outside help; the totally disabled not in need of outside help; the partially disabled. The peculiar feature of the soviet system lay in the assessment of disability, which considered two factors: disability as such, and the invalid's occupation. Similarly, the amount of the pension was the combined result of the degree of invalidity and the former earnings of the invalid concerned.

As in France, the pension right was not subject to any means test, but its amount was reduced by 20% in the case of rural pensioners whose income was drawn from an agricultural occupation.

Similar legislation existed or in 1946 was being evolved in Poland, Czechoslovakia, Yugoslavia and Greece; but its latest developments had not yet taken final legislative shape.

(A. F. D.)

Pepper

See SPICES; VEGETABLES.

Peppermint

See VEGETABLES.

Performing Right Societies

See SOCIETIES AND ASSOCIATIONS.

Perfume

See SOAP, PERFUMERY AND COSMETICS.

Perim

See ADEN.

Perkins, Milo Randolph

Perkins (1900–), U.S. government official, was born Jan. 28, 1900, in Milwaukee, Wis. A salesman and part owner of a burlap bag business, he became in 1935 assistant secretary in the department of agriculture. Two years later he was named assistant director of the Farm Security administration, and in Jan. 1939 he was transferred to the Agricultural Adjustment administration as associate administrator and was also named president of the Federal Surplus Commodities corporation. He originated the food stamp plan under which surplus foods were distributed free to the needy, and he established on a nation-wide scale the school lunch plan and low-price milk distribution. In 1941 he was appointed executive head of the Economic Defense board, retaining that post when this agency was reorganized as the Board of Economic Warfare on Dec. 17, 1941. In Nov. 1941 he was selected head of the U.S. section of the Canadian-U.S. Joint War Production committee and in April 1942 he was given control of the government program to acquire critical war materials.

In July 1943 President Roosevelt dissolved the BEW after Vice-President Henry A. Wallace aired publicly his quarrel with Jesse Jones, and transferred its functions to the Office of Economic Stabilization headed by Leo T. Crowley. Crowley announced that Perkins would not be retained in the new agency. Perkins subsequently retired from government service.

Permanent Court of International Justice

During the final ten years (1937–46) of its life, more than half of which were marked by forced inactivity as a result of World War II, the Permanent Court of International Justice dealt with eight cases, as follows:

Diversion of Water from the Meuse.—The Netherlands complained that certain works constructed by Belgium, or in contemplation, in connection with the Albert canal infringed a treaty of 1863. Belgium filed a counterclaim questioning whether or not the construction by the Netherlands of the Juliana canal and Borgharen barrage was compatible with the treaty. The court, after visiting the locality in 1937 dismissed both complaints.

Lighthouses in Crete and Samos.—France and Greece submitted a question whether or not an agreement of 1913 between a French firm and the Ottoman government extending the life of certain concession contracts relating to lighthouses was duly entered into and operative against Greece as regards lighthouses in Crete and Samos, territories assigned to Greece after the Balkan wars. The court in 1937 decided both questions in the affirmative.

Borchgrave Case.—Belgium and Spain submitted the question whether or not responsibility attached to Spain for the mysterious death, in Spain in 1936, of Baron Jacques de Borchgrave, a Belgian national. Belgium also charged lack of diligence in apprehending and punishing the guilty. The case was discontinued in 1938 at the request of the parties.

Phosphates in Morocco.—Italy instituted proceedings against France, charging that Italian nationals had been deprived of rights in phosphate deposits in Morocco contrary to treaty provisions. France questioned the jurisdiction of the court on the ground, *inter alia*, that the case arose before its declaration accepting compulsory jurisdiction and was outside that declaration. The court so held in 1938 and declined to take jurisdiction.

The Panevezys-Saldutiskis Railway Case.—Estonia charged Lithuania with refusal to recognize rights of an Estonian company in railway properties in Lithuania. Lithuania raised two preliminary objections relating, respectively, to the nationality of claims and the exhaustion of local remedies. The court decided to join the objections to the merits and consider them together. In 1939 it held the latter objection well founded and declined to entertain the claim.

The Electricity Company of Sofia and Bulgaria.—Belgium asked the court to declare that Bulgaria had failed in its international obligations toward the Electricity company of Sofia, a Belgian national. Bulgaria denied the jurisdiction of the court. The court upheld its jurisdiction and fixed the time for filing further documents; later, it indicated that pending final judgment Bulgaria should take no action prejudicial to the company. In Feb. 1940 it fixed May 16 for the opening of oral proceedings. These never took place. In Oct. 1945 the case was discontinued at the request of Belgium.

The "Société Commerciale de Belgique."—Belgium brought an action against Greece charging that the latter had refused to comply with arbitral awards in favour of the Belgian company.

The court in 1939 declared the awards definitive and obligatory.

Girliczy Case—Liechtenstein v. Hungary.—Liechtenstein charged that its national had been required to make cash settlements in Hungary contrary to a convention of 1924 between Hungary and Rumania relating to revalorization of debts and claims. Hungary appointed an agent and in Oct. 1939 the president of the court fixed the time for presentation of written pleadings. No further step was taken.

The court held its final meeting at The Hague, Oct. 26–31, 1945. It was formally dissolved by the assembly of the League of Nations at Geneva as of April 19, 1946, the International Court of Justice established by the United Nations, having meanwhile begun functioning. (See also INTERNATIONAL COURT OF JUSTICE.) (G. H. H.)

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Permanent Joint Board on Defense (U.S. and Canada)

See CANADIAN-U.S. WAR COMMITTEES.

Perón, Juan Domingo

Perón (1895–), Argentine army officer and statesman, was born Oct. 8, 1895, near Lobos, a small town south of Buenos Aires, and was educated in military schools, becoming a full lieutenant in the army by the time he was 20 years old. He became one of the leaders of the G.O.U. (Grupos de Oficiales Unidos) a nationalist clique of young army officers with totalitarian leanings, and played an important role in the coup d'état that overthrew the Castillo regime on June 4, 1943. In succeeding governments, Perón was the power behind the throne, although he held only minor official posts. In 1944, when Gen. Farrell became president, Perón was made war minister and vice

president. The strong totalitarian trend of the government and its refusal to eliminate "axis" influences were sharply criticized by Secretary of State Hull and President Roosevelt in 1944. Perón exploited these criticisms as evidence of U.S. "dollar diplomacy"—and refused to alter his policy.

In 1945, Perón was ousted in a short-lived military coup staged Oct. 9, but in less than two weeks was back in the saddle, with more authority than before. He was elected president in the elections, held Feb. 24, 1946, and was inaugurated the following June 4.

Wavering U.S. policy toward Argentina enabled Perón to entrench himself. While he was denounced in the state department Blue Book (Feb. 12, 1946), department officials subsequently declared that it would be "silly" for the U.S. to break with Argentina because France and Britain would not follow suit. He capitalized on Argentina's excellent situation with regard to food exports by notifying U.N.R.R.A. that Argentina would ship 50,000 tons of grain to Europe in June and promised further aid in July. However, on Aug. 15, 1946, he said Argentina would ship food only to those countries which could supply Argentina with manufactured goods. After ratification by the Argentine congress of the Act of Chapultepec and the U.N. charter, Perón declared that the era of Argentine "misunderstandings" with the Western Hemisphere nations was closed.

Persia

See IRAN.

Peru

A republic on the west coast of South America, Peru extends into the Amazon basin, bounded by Ecuador and Colombia on the north, Brazil and Bolivia on the east, Chile on the south, and the Pacific on the west. Area, 482,133 sq.mi.; pop. (1940 census), 7,023,111; this total was based on the number of persons enumerated (6,207,967) plus the calculated number of unenumerated persons (465,144) plus the estimated number of persons living in the jungles of eastern Peru (350,000). An official est. of pop. in 1944 was 7,522,684. The census of 1940 revealed a population density for the entire country of 14.56 per sq.mi., ranging from 0.43 per sq.mi. in the department of Madre de Dios to 56.42 per sq.mi. in that of Lima, although the constitutional province of Callao (14 sq.mi.) had a density of 6,031.29 per sq.mi. The population was estimated as 52.9% white and mestizo and 45.9% Indian, but more than 51% normally speak Indian languages. Peru contains the second largest number (Brazil is first) of Japanese in any Latin American country, an estimated 23,000; the number of Chinese was estimated at 17,000 and the Negroes at 29,000. The capital is Lima (pop., 1940 census, 533,645; 1945 est., 628,821); other important urban centres (with pop. by 1940 census; if a second fig. is given it is that of a 1945 est.) are Callao (84,438); Arequipa (79,185); Cusco (45,158; 45,230); Trujillo (38,961; 41,589); Iquitos (34,231); Chiclayo (32,646); Huanacayo (28,679); Sullana (22,344); Ica (21,437); and Piura (20,093; 29,674).

The constitution of 1933 (amended in 1936 and 1938) established a unitary government with 22 territorial departments, an executive branch headed by a president and two vice-presidents, all chosen by direct, popular election for six-year terms and ineligible for re-election until after an intervening term, a bicameral congress including a senate of 54 members elected by departments and a chamber of deputies of 156 members, both elected for six-year terms, and a judiciary headed by a supreme court of 16 members elected by the congress. Presidents during the decade 1937–

46 included Marshal Óscar Raimundo Benavides, 1933 to Dec. 8, 1939; Manuel Prado y Ugarteche, Dec. 8, 1939 to July 28, 1945; José Luis Bustamante y Rivero, after the latter date.

Prewar Politics.—The chief disturbing factor in Peruvian affairs at the outset of the decade in 1937 was the continued agitation by members of the outlawed Apra (*Alianza Popular Revolucionaria Americana*). This group, under the leadership of the internationally known Víctor Raúl Haya de la Torre, had been active in Peruvian politics for some seven or eight years prior to 1937. As the presidential candidate of the Apristas in 1931, Haya de la Torre was allegedly chosen president but was kept from the office by fraudulent counting of the votes. Gen. Oscar Benavides had come into the presidency following the assassination of Pres. Luis Sánchez Cerro in 1933. New elections were set for 1936, but when the Aprista-supported candidate (the party itself had been proscribed in the meantime) appeared to be winning, the congress voided the elections, granted Pres. Benavides dictatorial powers and dissolved itself. That situation prevailed at the beginning of 1937, but Apristas, embittered by the results of the 1936 elections, continued undercover political opposition; this resulted in disorders and many arrests. Economic conditions continued their steady improvement characteristic from 1932, the betterment being chiefly the result of increased production of gold and cotton.

Peruvian development in 1938 was marked by general quiet, except for an unsuccessful rebellion in October. The government began work in Jan. 1938 on the construction of a new port at Matarani on the southern coast to replace Mollendo as a Pacific rail terminus. Improvements at Callao, the port of Lima a few mi. inland, were completed in July, making that port one of the best equipped on the west coast of South America; the improvements included a new graving dock. Peru was host to the eighth Pan-American conference at Lima in Dec. 1938; the conference assumed unusual importance in view of the gathering war clouds in Europe and the conference at Munich.

A change in administration, if not an immediate reorientation of domestic political policy, occurred in 1939. Retirement of Gen. Benavides as president-dictator was forecast as early as February, when his minister of the interior and police, Gen. Antonio Rodríguez, was killed in an abortive attempt to seize the presidency. Gen. Benavides decided, however, to retire voluntarily from the presidency; he first brought about a plebiscite which gave the executive greatly increased powers. His followers asserted that his administration had been one of the most constructive in Peru in many years, and pointed as evidence to modern urban workingmen's homes and model villages, a compulsory social insurance project, and an ambitious highway program; opponents charged him with ruling with oppressive methods, driving the political opposition into hiding or exile or throwing its members into jail and stifling democracy and free speech. Pres. Benavides' hand-picked candidate, Dr. Manuel Prado, son of an earlier Peruvian president, won easily in the elections in Oct. 1939 and was inaugurated Dec. 8; he was the first civilian president chosen in ten years. Benavides was named ambassador to Spain. Prado pledged himself to a middle-of-the-road and democratic policy, but it was alleged that more than 1,000 political prisoners remained jailed, and many opponents of Benavides continued in exile. Later, however, Pres. Prado moved toward a general restoration of civil liberties.

Anti-axis Policies.—Peru declared its strict neutrality

upon the outbreak of World War II in Sept. 1939. From even before the beginning of hostilities, Peru had been made a centre of axis intrigue and propaganda, partly because of the considerable numbers of axis aliens in the country (est., in addition to the large Japanese colony, at 2,100 Germans plus 1,900 citizens of German descent and 7,600 Italians plus 4,000 citizens of Italian descent). The government issued decrees against profiteering in order to ease the economic dislocation caused by the war. Peru adjusted its international policy in general accord with that of the United States, and supported that government in its hemisphere defense proposals at the second inter-American foreign ministers' conference at Habana, Cuba, in July 1940. U.S. efforts to obtain naval base rights on the northern Peruvian coast failed, however. Several popular demonstrations of anti-axis feeling occurred in 1940 and 1941. The government took over and nationalized the Italian Caproni aircraft assembly plant near Lima and supplanted an Italian military and aviation mission which had been stationed for some years in Peru with one from the United States. A more dramatic development occurred in May 1941, when crews of five German ships sought to escape from Callao harbour and then scuttled their vessels when it became clear that Peru proposed to follow the United States' lead in seizing such vessels. The Peruvian government in retaliation forbade Transocean, the German news agency, to carry on operations in the country, withdrew diplomatic immunity from axis mail pouches, and cancelled the concession to the German Lufthansa airline, confiscating its planes; it also took steps to freeze German and Italian credits. After the Japanese attack on Pearl Harbor in Dec. 1941, Peru promptly froze Japanese credits and granted the United States nonbelligerent rights.

There was a considerable reorientation in the policy of the Apristas, who formerly had strongly opposed the alleged imperialism of the United States in Latin America but by 1940 were increasingly convinced that the greater menace was that of a victorious axis.

Boundary Dispute with Ecuador.—The long-standing boundary controversy with Ecuador, meanwhile, had been causing difficulties. Negotiations for an amicable settlement of the dispute had been started in Washington, D.C., in Sept. 1936, with an agreement to accept U.S. arbitration in the event of the failure of direct negotiations. Friction along the frontier became acute in June 1937, with the dictators of both disputing countries being unwilling to make concessions or to appear conciliatory lest the attitude be capitalized upon by opposing domestic political factions. The immediate crisis passed, but the dispute itself was no nearer a settlement. It involved more than 100,000 sq. mi. of land, chiefly in the Ecuadorian Oriente, a triangular strip east of the Andes mountains.

The dispute flared into prominence again in 1941. Border friction was renewed in Jan. 1941, following which Brazil, Argentina and the United States offered mediation of the dispute, which both countries accepted. Ecuador insisted, however, that any mediation or arbitration must include a decision of sovereignty over the coastal province of Tumbes, thus reviving a long-dormant claim; the nearby province of Jaén was also involved in part. Inasmuch as Tumbes had been under effective Peruvian occupation for more than a century and was inhabited largely by Peruvians, the effect of Ecuador's claim was to arouse strong feeling in the former country. Border incidents were almost daily occurrences by July, and at that

time Peruvian forces expelled Ecuadorian troops not only from the disputed points but from additional territory that was unquestionably Ecuadorian. This drastic action, assertedly undertaken in retaliation for attacks by Ecuadorians, brought the two republics to the verge of war. Withdrawal of the Peruvian forces was brought about only after pressure exerted by foreign governments. The mediating states and others at length persuaded the two disputants, on Oct. 2, 1941, to agree to the establishment of a 15-km. neutral zone patrolled only by Ecuadorian civil authorities. The agreement became effective Oct. 10 and, although it was temporary, it served to prevent further clashes while mediation efforts were continued.

When interforeign office discussions were under way, soon after the U.S. entrance into World War II, looking to the early convening of the third inter-American foreign ministers' conference, Ecuador temporarily threatened to disrupt the plans by insisting that the boundary dispute with Peru be placed on the conference agenda. Peru finally consented to have the matter discussed at the Rio de Janeiro conference and, although the question was not officially placed on the program, prominent delegates at the conference, notably Undersecretary Sumner Welles of the United States, were active in attempting to find a solution not only for the repeated incidents of 1941 and earlier but also for the disputed boundary itself. Just before the conclusion of the conference, it was announced that the dispute had been settled and the boundary delimited in general. By the agreement, Peru received full sovereignty over the major part of the disputed Amazonian territories and its claims to the Tumbes area were upheld. The disputing governments then created a joint boundary commission and, with technical assistance from the United States, Brazil and the other mediating governments, began the protracted job of surveying and fixing the boundary.

Representatives of the two countries involved signed an agreement at Rio de Janeiro on May 20, 1944, definitely settling four of the six sections of the boundary. Demarcation of four sections was settled to the mutual satisfaction of both disputants by 1944. The fifth and sixth sections of the boundary were left to a Brazilian arbitrator; the Brazilian government later appointed a naval officer for that purpose. The Peruvian and Ecuadorian foreign ministers exchanged notes on May 23, 1944, accepting the settlement.

Internal Problems.—Peru was free, as a result of the settlement, to turn its attention to some of the other problems facing the republic. The government paid considerable attention to projects for the development of Peruvian agricultural and industrial resources, both as temporary expedients to relieve the economic distress during wartime and also as measures to avoid similar troubles in the future. The government also rapidly pushed its highway program, especially the completion of the road across the Andes to Pucallpa on the Ucayali river, a tributary of the Amazon; the road was designed to provide more direct access to Iquitos, centre of Peruvian settlement in the Oriente territory. Peru and the United States concluded ten agreements during the year, some as the result of a series of conferences at Washington, D.C., in April between U.S. officials and Minister of Finance and Commerce David Dasso, and others as a consequence of an official visit to the United States the following month by Pres. Prado. The agreements included contracts for U.S. purchase of Peruvian rubber, cotton (in this case, for Peru's entire surplus), rotenone and flax. The commodity agreements generally provided for U.S. financial aid in developing production, and for the purchase of all exportable output; U.S. agencies also purchased exportable surpluses of copper and other minerals. The two governments concluded lend-lease and reciprocal trade agreements on Mar. 11 and May 7, 1942, respectively.

Peruvian tin plant at Oroya, where the metal is produced electrolytically



Peruvian problems during 1943 continued to be primarily internal. Imports were limited because of lack of shipping and priorities, and some unrest was caused in April and June by food shortages, caused partly by a poor rice crop the preceding year. The government found it necessary, in consequence, to take over all supplies of rice and beans, and to fix prices on these staple foodstuffs. The government on Aug. 27, 1943, established a central price control board in an attempt to hold down rapidly rising prices as far as possible. The government also endeavored to direct agricultural effort away from production of the staple crops, cotton and sugar, and toward diversified food crops. In an effort to increase diversification, a co-operative agreement was signed with the United States on May 19, the latter government agreeing to provide technical aid. A herd of zebu cattle, which had been purchased in Brazil to cross with native cattle, arrived in Peru in July. The Inter-American Co-operative Food Production service, a joint Peruvian-U.S. venture, undertook the development of new acreage, production and dry farming. U.S. technical assistance was also made available in 1943 for a health and sanitation program.

The United States Metals Reserve company signed a general agreement with the government of Peru in July 1943 by which the United States committed itself to buy all strategic materials up to 125% of 1942 exports; the list of materials involved included such vital ores as antimony, copper, lead, mercury, molybdenum, tungsten, vanadium and zinc. An important industrial project got under way during 1943 in the formation of the government-directed Santa corporation, with a \$15,500,000 capitalization. The project was designed for the general development of the valley of the Santa river in northern Peru, somewhat along the lines of the TVA in the United States. It was hoped that the corporation could develop Peru's untouched iron ore deposits and accessory transportation facilities to such an extent that the republic would be independent in iron and steel needs. The 522-mi. highway connecting the Pacific coast with the Ucayali river was opened Sept. 7, 1943, and the government announced plans for other trans-Andean links.

Peruvian capital began in 1943 to purchase many enterprises formerly owned by axis nationals and subsequently expropriated by the Peruvian government. The Japanese residents caused additional concern during the year because of their key positions in some fields of production; as a consequence, the government rigidly limited their activities and freedom of action. A fire on May 10, thought by some to be of incendiary origin, caused the destruction of the National Library of Peru, with the loss of many priceless manuscripts. A campaign was subsequently started to try to restore the collection by gifts insofar as this was possible. The Library of Congress of the United States donated photostatic copies of many early Peruvian manuscripts in its collections, and other donations were received from practically all countries of the hemisphere.

The government announced on Jan. 14, 1944, that a German-Japanese plot scheduled for New Year's eve had been thwarted; the plot would have started, it was alleged, with anti-Semitic outbreaks. Several enemy aliens were arrested in the following days, and the government on Jan. 22 decreed the liquidation of German banking interests and the sale of expropriated axis property, with the proceeds to be used for the repatriation of Peruvian bonds. Lt. Gen. George H. Brett of the U.S. Caribbean defense command arrived in Lima Feb. 8 for two days of discussions about defense problems. On July 10 representatives of Peru and the United States signed an agreement for

a third United States military mission, to last for four years. The Peruvian-U.S. food agreement was on Aug. 3 extended to Aug. 31, 1945; the two governments on Aug. 12 concluded an agreement for construction of a penicillin plant in Peru. The Office of the Coordinator of Inter-American Affairs, a U.S. agency, signed an agreement with Peru on March 16 extending for three years the health services it had been rendering, and on April 5 it concluded an arrangement for a co-operative development of Peruvian educational facilities.

In anticipation of the 1945 presidential elections, party activity increased greatly during 1944. The National Democratic front, an antiadministration coalition, was formed in June and advocated free suffrage, a civilian president in 1945 and uncontrolled elections. On Nov. 25 the cabinet set the election date for June 10, 1945; it provided that the number of senate seats be increased from 48 to 54 and seats in the chamber of deputies from 140 to 156. Several high officials resigned their posts on Dec. 8 in observance of the constitutional requirement that candidates must resign public offices six months before an election. The government announced on May 6 that it would purchase the entire rice crop of the year in order to control costs and distribution. The United Kingdom resumed its cotton purchases late in September.

The presidential election of June 10, 1945, was said to be the first free election in several decades. Maj. Gen. Ureta announced his candidacy formally March 16, and on March 19 the candidacy of José Bustamante Rivero, recently resigned ambassador to Bolivia, was launched by the Frente Democrático Nacional, the antiadministration coalition with the long-suppressed Apra as its chief component; the latter group was later legalized as the *Partido del Pueblo* (Party of the People). Gen. Óscar Benavides, who, it was widely thought, would emerge as the principal antiadministration candidate, did not announce himself. Various Aprista exiles, including the well-known Luis Alberto Sánchez and Manuel Seoane, returned to Peru May 8 after amnesty had been granted. The election was held as scheduled, without serious disorder and with a large vote cast. Final results gave Bustamante 305,590 to 150,720 votes for Ureta. Democratic elements hailed the election as one of an increasing number of instances in Latin America in which the candidate of the "outs" triumphed; the election was also pointed to as a significant example of a civilian victory over a military candidate. Bustamante was inaugurated July 28.

The government on Feb. 12 acknowledged a state of belligerency with Germany and Japan; Peru signed the United Nations pact Feb. 14. The United Nations charter was ratified Oct. 15. A government decree on Jan. 6 required all non-Catholic religious activities to be held privately inside their respective churches. Pope Pius XII on Jan. 12 created three new Peruvian dioceses and on Dec. 23 announced the elevation of Giovanni Guevara, archbishop of Lima, to be Peru's first cardinal. The government on March 16 frustrated a revolutionary plot at the Ancón air base north of Lima. The chamber of deputies on Aug. 6 approved a diplomatic break with Spain and urged establishment of relations with the soviet union. A political crisis early in October resulted in the choice of a complete new cabinet on Oct. 5. The public debt, largely in default, was regularized by announcement on Aug. 27 of plans to resume servicing. Finance Minister Montero Bernales introduced three bills on Oct. 24 aimed at controlling inflation, restoring foreign and domestic credit

Peru: Statistical Data

Item	1938		1941		1943	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
United States		1 sol = 23 cents		1 sol = 15.38 cents		1 sol = 15.38 cents
Great Britain		19.81 soles = £1		26.16 soles = £1		26.16 soles = £1
Finance						
Government revenues	\$50,976 (£10,427)		\$33,260* (£8,684)		\$70,689† (£17,519)	
Government expenditures	\$61,052 (£12,488)		\$35,021* (£9,144)		\$70,689† (£17,519)	
Gold reserves	\$11,385 (£2,329)					
National debt	\$131,555 (£26,908)		\$107,332* (£28,024)		\$225,455† (£55,875)	
Transportation						
Railroads		2,600 mi.				2,602 mi.
Highways		14,074 "				19,109 "
Waterways (Amazon and tributaries)		3,500 "				3,500 "
Airways		6,041 "				3,456 "
Communication				35,151		
Telephones		25,981		11,652 mi.		11,874 mi.
Telegraph lines		11,016 mi.		...		78,000
Radio sets		25,000				
Minerals						
Petroleum		2,311,009 tons		1,745,214 tons		2,147,696 tons
Gold		260,326 oz.		285,191 oz.		199,624 oz.
Silver		20,552,816 "		15,119,168 "		14,659,723 "
Copper		41,368 tons		40,589 tons		36,825 tons
Lead		63,982 "		55,167 "		52,701 "
Crops						
Sugar cane		3,278,376 tons		4,274,453 tons		3,877,891 tons
Wheat		113,621 "		110,589 "		99,515 "
Cotton		94,671 "		166,817 "		78,654 "
Livestock						
Sheep		12,000,000†			13,829,505	
Cattle		2,310,000†			2,332,309	
Horses		965,000†			439,945	
Forest products						
Cuba (barbasco root)		616 tons§				29,459 tons
Rubber		865 "				13,191 "
Tagua (ivory nuts)		1,488 "				4,598 "
Balata		220 "				1,548 "
Sea products						
Total						29,459 tons
Bonitos						13,191 "
Caballitos						4,598 "
Cabrillas						1,548 "
Exports						
Total	\$78,690 (£16,095)	...	\$75,992 (£18,847)	...	\$70,797 (£17,546)	2,158,000 tons
Petroleum and petroleum products	\$26,655 (£5,452)	1,881,000 tons	\$17,252 (£4,279)	2,179,000 tons	\$16,009 (£3,968)	1,701,000 "
Cotton and cotton products	\$14,879 (£3,043)	157,000 "	\$19,634 (£4,870)	152,000 "	\$10,765 (£2,668)	40,000 "
Copper (bars, ores, concentrates)	\$14,154 (£2,895)	57,000 "	\$11,573 (£2,870)	64,000 "	\$11,864 (£2,940)	44,000 "
Sugar	\$5,737 (£1,173)	275,000 "	\$9,266 (£2,298)	421,000 "	\$11,461 (£2,840)	199,000 "
Imports						
Total	\$59,837 (£12,239)	...	\$55,034 (£13,649)	...	\$69,113 (£17,128)	419,072 "
Tools, machinery, naval supplies, and vehicles	\$14,927 (£3,053)	...	\$12,729 (£3,157)	...	\$11,624 (£2,881)	...
Foodstuffs	\$8,859 (£1,812)	...	\$6,506 (£1,614)	...	\$8,224 (£2,038)	...
Metals and jewellery	\$6,921 (£1,416)	...	\$6,504 (£1,613)	...	\$6,996 (£1,734)	...
Cotton goods	\$4,142 (£847)	...	\$2,696 (£669)	...	\$6,019 (£1,492)	...
Defense						
Standing army personnel		11,000		14,551*		
Reserves		20,000		470,895*		
Standing air force personnel		1,677		1,935*		
Military expenditures	\$8.165 (£1,670)		...			
Education						
Primary schools		4,727		6,059†		
Enrolment		492,989		688,377†		
Intermediate schools		216		741		
Enrolment . . . . .		...		99,325†		
Universities		5		51		
Enrolment . . . . .		...		5,033†		

*1940. †1944. ‡1937. §Exports only. ||1939. ¶1942.

and reforming the functions of the Central Reserve bank. U.S. purchases of metals and minerals were cut back considerably in 1945. Pres. Bustamante on Dec. 16 signed a free-press law, eliminating control by the supreme court.

A new cabinet, named Jan. 24, 1946, included for the first time three members of the Party of the People (formerly Apra). The Apra gained substantially in both houses of the congress in elections held June 30, winning 2 senators and 11 deputies; the opposition was then left with only 2 senators and 4 deputies. The electoral jury (a qualifications board) subsequently disqualified one Apra deputy but the party gained two more by "conversion." Some disorders occurred during the year, notably an attack by an Aprista mob on an opposition demonstration and newspapers on April 13, and, at various times, riots caused by food shortages; a brawl between U.S. army and Peruvian navy personnel occurred at Talara July 28. The government early in the year announced extensive plans for promotion of tourist trade, stating that 13 government-financed tourist hotels were either planned or under construction and that 15 others had been completed within the previous five years. The International Petroleum company revealed plans for construction of a completely

modern industrial town near Talara at a cost of 10,000,000 soles (1 sol valued at 15.38 U.S. cents); it was announced on June 9 that rich oil resources had been discovered in the Andean foothills. The government laid plans early in 1946 for the inauguration of the new Lima-tambo airport near Lima, one of the largest in South America, on July 28.

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Pests, Agricultural

See ENTOMOLOGY.

Pétain, Henri Philippe

Pétain (1856–), French army officer and statesman, was born May 24, 1856, at Cauchy la Tour in the Pas-de-Calais department of France. He attended St. Cyr military academy and was commissioned an officer after graduation. Rising to the rank of colonel in 1910, he was in command of an infantry regiment at the outbreak of World War I.

Pétain distinguished himself in the fighting at Artois (1914) and Arras (1915); he was made commander of the 2nd army with the rank of a full general in June 1915. Although his reputation declined after the costly Champagne offensive in Sept. 1915, it rose again with his successful defense of Verdun in 1916. Made a marshal of France on Nov. 21, 1918, he led French forces which put down the Rif revolt in 1925 and in 1934 he was made minister of war in Gaston Doumergue's cabinet.

Called from virtual retirement in 1939 to become ambassador to Spain after Francisco Franco's triumph, he remained in this post until May 18, 1940, when he was summoned to Paris to act as vice-president of the government council and adviser to the minister of war. As France's armies were unable to check the German onrush, Pétain, who succeeded Paul Reynaud as premier, sued for peace and concluded the armistice of June 22, 1940, with Adolf Hitler. Pétain moved his government to Vichy in unoccupied France and authorized Pierre Laval to prepare a new constitution. Pétain named Laval his successor, but dropped him from the cabinet on Dec. 13, 1940.

Pétain meanwhile had assumed dictatorial powers. He submitted to Nazi deportation of French workmen for labour in Reich factories in 1941 and 1942, and bitterly protested the Allied landings in North Africa on Nov. 8, 1942, severing diplomatic ties with Washington. He also opposed German occupation of all France Nov. 11, 1942, terming this action a violation of the armistice terms. In May 1943 Pétain conceded that "open opposition" to his policies had slowed the "reconstruction" of France. He did not greet the Allied landings in Normany June 6, 1944, with enthusiasm, appealing in a broadcast the same day to Frenchmen to refrain from actions that would result in "tragic reprisals." As the Allied armies drove deeper into France, Pétain allegedly rejected a German offer of haven in the Reich; as a result, the Germans reportedly placed him under arrest, forcibly transporting the marshal to German soil. The German radio's version (Sept. 30, 1944) of this incident was that Pétain had voluntarily fled to the Reich.

As the defeat of Germany drew near, Pétain entered Switzerland in April 1945. He voluntarily returned to France on April 26, and was arrested at the border. On the opening day of his trial at Paris (July 23, 1945), Pétain asserted: "I sacrificed my prestige for the French people. If I treated with the enemy, it was to spare you." The theme of the accusations against the marshal was that he conspired to destroy the Third Republic and weakened its defenses before and during the war. The question of treason was side-stepped by many of the prosecution witnesses, who declared there were many "definitions" for the word. Pétain himself remained silent throughout most of the trial, presumably on advice of counsel, and rarely took the stand in his own defense. The tenor of the pleas in his behalf was that, although outwardly submitting to the Nazis, he had secretly defied them. He was found guilty on Aug. 15, 1945, on charges of intelligence with the enemy and was sentenced to death, but Gen. Charles de Gaulle commuted the sentence to life imprisonment.

Peter II

King Peter of Yugoslavia (1923–) was born Sept. 6, 1923, in Belgrade, the son of Alexander I of the house of Karagjorgjevič. When Alexander was slain in Marseilles in 1934, Peter succeeded to the throne; a regency headed by Alexander's brother, Prince Paul, was set up to rule until the young king reached his majority. The re-

gency and the pro-axis government of Premier Cvetkovitch was ousted when the army staged a coup in protest against signature of the axis pact, March 25, 1941, and Peter was placed on the throne. The new government headed by Gen. Simovitch refused to honour the treaty; as a result Hitler's armies invaded Yugoslavia, crushing its army in a fortnight.

Peter fled to London, where a Yugoslav government-in-exile was set up. Both Peter and his government were opposed to Marshal Tito's partisans, but the Allied decision to support the partisan movement compelled the king to agree to a working relationship with Tito, and the two Yugoslav regimes reached an agreement, June 18, 1944. Tito emphasized, however, that restoration of the monarchy would depend on the outcome of a postwar plebiscite. Reluctantly Peter consented to permit the royal delegates to proceed to Belgrade and participate in promotion of a single government under a regency. Tito's declaration of Aug. 7, that a monarchy was "incompatible" with a democracy in Yugoslavia, brought prompt reaction from Peter, who assailed Tito for having proclaimed a dictatorship. On Nov. 29, 1945, the Yugoslav constituent assembly proclaimed a republic and abolished the monarchy. Peter refused to accept the decision, but the U.S. and Great Britain recognized the republic, Dec. 22, 1945, thus writing off Peter's regime.

King Peter married Princess Alexandra of Greece, March 20, 1944, in London.

Petit de Julleville, Pietro

Cardinal Petit de Julleville (1876–), French prelate and archbishop of Rouen, was born Nov. 22, 1876, at Digione, son of a celebrated French historian of literature, Louis Petit de Julleville. Ordained priest in 1903, he served as superior of the Diocesan college near Paris. A chaplain in the French army during World War I, he was seriously gassed and was cited for courage under fire.

Elevated to the rank of bishop in 1927, he was named archbishop of Rouen and primate of Normandy in 1936. He remained in the city during the German invasion of 1940 and ordered his priests to leave the parishes only after the departure of the last inhabitant. He remained in his residence at the foot of the cathedral, which was under continual bombardment. When his residence was later ransacked, he moved to a little room in the Faubourg convent.

His nomination by Pope Pius XII to the Sacred College of Cardinals was announced Dec. 23, 1945, and he was proclaimed a cardinal at the consistory of Feb. 18, 1946.

Petrol

See PETROLEUM.

Petroleum

In the years prior to World War II, the trend away from private ownership of mineral rights toward the nationalization (government ownership or control) both of natural resources and of industries (cartelization) increased. Generally speaking, no other country recognized the surface landowner as the owner of the subsoil as did the United States. There were exceptions in some limited private titles existing in Canada, Colombia, Mexico, Trinidad, Rumania and Poland. Excepted, also, were certain private titles belonging to native princes in India, Burma and the two parts of British-controlled Borneo.

In the western hemisphere particularly nationalization

of the subsoil took place on an ascending scale. This was true in Argentina, Uruguay, Chile and Brazil, while Mexico and Bolivia furnished examples of nationalization accompanied by expropriation and seizure of foreign oil properties in 1938 and 1937 respectively.

Mexican Expropriation.—Oil production in Mexico, largely developed by U.S., British and Dutch interests, reached a peak of 549,000 barrels daily in 1921, second only to that of the United States. By 1926 it had dropped to 247,000 barrels and the following year to 176,000 barrels, or less than one-third of the 1921 peak. During the 1930s it averaged only slightly more than 100,000 barrels daily.

This production decline was the result of several causes in addition to the going to salt water of the prolific "Golden Lane" fields in the early 1920s. First, from May 1, 1917, until the end of 1926, no legislation existed by which petroleum lands not acquired prior to the nationalization of subsoil resources under the 1917 constitution could be explored or exploited, except under the conditions laid down in the Carranza decrees of 1918, the legality of which had been challenged in the courts and which precipitated years of diplomatic representation by the United States, British and Dutch governments on behalf of the private rights of their nationals in Mexico vested prior to 1917. Second, in the 1920s, petroleum and export taxation was greatly increased. Third, radical labour began to manifest itself in the 1930s, and a series of strikes greatly hampered operations.

In the meantime, important oil fields had been discovered in Venezuela, where the policy of the government was to encourage development by foreign capital. Many foreign companies in Mexico turned their attention to these new and more promising fields, and the period of liquidation and abandonment of Mexican investments began. Of the 22 major companies in Mexico in 1921, 7 definitely retired from business in that country, 6 with severe losses and the holdings of 9 others were absorbed by purchase by other companies. No new companies of importance ventured into Mexico during the 1930s except the semiofficial *Petroleos de Mexico*.

The support of foreign oil companies by their governments was ineffectual in the 1930s as agitation against foreign oil interests by radical labour elements in Mexico gathered momentum. Heavy awards to labour were made. Management was stripped of many of its normal administrative functions, and companies felt that justice was denied them in Mexican courts. Finally, as the result of their inability to carry out a labour award declared to be beyond their economic capacity, the Mexican government on March 18, 1938, expropriated properties of U.S., British and Dutch companies with few exceptions. This action substantially meant a retroactive application so long feared by the operators, since the Mexican government, in applying the decree of expropriation and the courts in interpreting it, did so on the basis that the subsoil had belonged to the government.

Certain U.S. companies made monetary settlements by direct negotiations with the Mexican government. The U.S. department of state insisted upon prompt, adequate and effective compensation, and in 1941 the Cooke-Zevada commission was set up which placed the value of expropriated properties of other U.S. companies at \$24,000,000 plus interest of approximately \$5,000,000, although the properties were valued by their owners at several times that amount.

An attempt to ascertain losses sustained by U.S. companies as a direct result of expropriation in Mexico was made by the group on American petroleum interests in foreign countries in its report to the special senate committee investigating petroleum resources (1945). Incomplete returns from only 4 companies showed an estimated net loss of more than \$80,000,000. England embargoed all oil from Mexico following the expropriation, an embargo still in effect in 1946. On Feb. 7, 1946, through an exchange of notes by the Mexican government with the Dutch and British diplomatic representatives, an agreement was reached for negotiating a settlement for the expropriated oil properties of Dutch and British nationals. Meantime, the Mexican oil industry became almost totally operated by the government-owned and controlled *Petroleos de Mexico*.

Seizure of U.S. Properties in Bolivia.—Following a change in the government's oil policy from one of approval of oil development by foreign interests, and the creation of a government-sponsored enterprise, *Yacimientos Petroliferos Fiscales Bolivianos*, the Bolivian government seized the properties of the Standard Oil Company of Bolivia on March 15, 1937, after the company had spent \$17,000,000 on exploration, the drilling of 28 wells and the construction of 2 small refineries, camps, roads and sanitation facilities. Finally the Bolivian government agreed to pay the Standard Oil company (New Jersey) a total of \$1,500,000 for the sale of all its rights, interests and properties in Bolivia and those of its subsidiaries, Standard Oil Company of Bolivia, as they existed immediately prior to the seizure. This represented a net loss of \$15,500,000 to the company.

Marketing Cartels.—In petroleum marketing, government monopolies or government-imposed restrictions or trade agreements adversely affecting foreign companies manifested themselves in Spain, Italy, France, Rumania, England, Portugal, Czechoslovakia, Hungary, Yugoslavia, Turkey, Argentina, Uruguay, Chile and other countries before World War II. In several instances the government itself cartelized the industry or set up a petroleum regime in which the government was represented by direct or indirect ownership or control of a local oil company. A foreign oil corporation often was either prohibited from doing business or could do business only as a minor stockholder of a national corporation.

During this period, U.S. oil companies invested a considerable amount of capital in refineries in foreign countries as a protection to their long-established marketing interests in these countries. Among the measures used to induce or force the building of such refineries were tariff differentials, foreign exchange restrictions, licensing of imports and refineries and government participation in refining.

Substitute Fuels.—Many governments imposed discriminatory excise taxes on imported petroleum products in order to stimulate the production and consumption of domestic products such as alcohol made from grain and other synthetic fuels. Germany built up a large synthetic gasoline industry by processing coal and lignite, estimated to be producing 33,000 bbl. daily in 1938, a fivefold increase over 1933, and to have 100,000 bbl. daily capacity before Germany invaded Poland in 1939.

World Demand Increases.—World consumption of petroleum products increased greatly prior to World War II, and it was significant that while total exports of these products from the United States mounted, the percentage relationship to total indicated foreign demand (exclusive of the United States) declined in the 1930s to 19.6% com-

pared with 32.6% in the 1920s. This was chiefly due to the development of oil production abroad by U.S. and other companies, the major proportion of which was marketed abroad. U.S. companies were able to supplement U.S. exports from foreign sources, while the Royal Dutch-Shell company and the Anglo-Iranian Oil Company, Ltd., also extended their activities and drew on foreign oil sources in increasing amounts, particularly in the middle east.

The United States, with 68.1% of world motor vehicle registration in 1938, accounted for 63.5% of the indicated total world demand for motor fuel. In 1938, the United States had a motor vehicle registration totalling 31,500,000 cars, with all other countries totalling 14,750,000. Nevertheless, registration outside the United States increased markedly during the interwar period. In 1919 it was only 14% of the total world and rose to 32% in 1938, from 1,125,000 to 14,750,000 vehicles. The U.S.S.R. showed the greatest rate of growth but had only slightly more than 1,000,000 vehicles or 2½% of the world total, virtually all commercial. Excluding the United States, Europe and Africa accounted for 64% of total motor vehicle registration and 54% of total motor fuel demand in 1938.

Modern distribution methods, especially for bulk distribution of gasoline through pumps and service stations, was accomplished in many European and Latin American countries. In fact, just prior to World War II, methods in many nations had reached almost the same degree of efficiency as in the United States. This was particularly true in such countries as England, France, Holland, Belgium, Sweden, Germany, Italy, Brazil and Argentina.

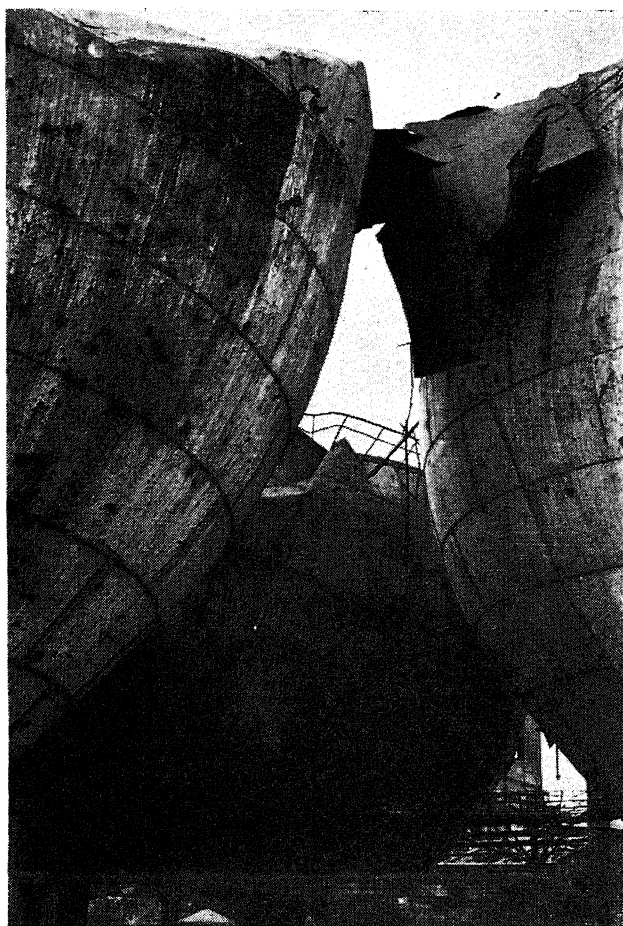
Petroleum companies which had learned to provide bunkering facilities for steamships at every port of call were forming world-wide organizations to supply fuel and lubricants to international airways as well as local airways prior to World War II.

New Production Sources.—The late 1930s witnessed large gains in oil production in the United States and in the middle east and in Venezuela. In the middle east, Iran increased production from 125,000 barrels daily in 1930 to 213,000 barrels in 1938; Iraq from 2,000 barrels to 89,000 barrels; added were the new fields on Bahrain Island and in Saudi Arabia, producing 22,000 and 1,000 barrels daily respectively in 1938. In Venezuela, output gained from 375,000 barrels daily in 1930 to 522,000 barrels in 1938.

Oil as a Vital Munition.—World War II demonstrated the supreme importance of oil as a munition. U.S. military gasoline consumption at the peak of World War II was 100 times that of its overseas forces at the peak of World War I. The U.S. army and navy had 600 times as many automotive vehicles as the A.E.F. had in Europe in 1918. The navy and merchant marine had more ships and more tonnage than the combined merchant fleets of the world after World War I. The U.S. army and navy operated 1,250% more planes before V-E day than they did before Pearl Harbor (Dec. 7, 1941). This was U.S. armament alone; the planes, vehicles and ships of the other United Nations likewise multiplied in number and consumed proportionately huge quantities of oil products.

The tonnage of oil products shipped overseas from the United States during the last few months of the war was almost double all other tonnage combined. U.S. overseas forces required nearly twice as many tons of oil as of arms and armament, ammunition, transportation and construction equipment, food, clothing, shelter, medical supplies and all other materials together. In both essentiality and quantity, oil became the greatest of all munitions.

Great as were the overseas petroleum requirements, two and one-half times as much oil was required for the war-



Ruptured ammonia tanks standing askew at Leuna synthetic oil plant in Merseburg, Germany, after repeated Allied air attacks in 1944. Systematic bombing of oil plants and refineries finally immobilized the German wehrmacht and luftwaffe

supporting economy at home in the United States. Even with rationing, conversion to coal and other oil-conservation measures, civilian consumption was not much below pre-Pearl Harbor volume, the savings being largely offset by the needs of a vastly expanded war industry.

Essential civilian consumption of other Allied and neutral nations, while not so great as that of the U.S., was no negligible item. The oil and oil products supplied from Allied sources to Allied and neutral civilian economies, not including the U.S.S.R. or consumption in the countries where the oil was produced, reached about 550,000 barrels a day, equal to 15% of the civilian consumption of the United States.

The job of fuelling and lubricating the war was worldwide. Crude oil came from 20 Allied, neutral and liberated countries on 5 continents. Some of it was refined near its point of production, some had to be moved to the refineries and the refined products to the points of need. The transportation facilities of the five continents and the seven seas had to be utilized. The global war demands meant global production, global refining and global distribution.

Petroleum Organization for War.—The petroleum organization for war which fuelled the United Nations to victory centred around the U.S. oil industry and the U.S. Petroleum Administration for War, inasmuch as U.S. oil was called upon to supply the bulk of the United Nations' needs.

In the United States the Office of Petroleum Coordinator was created on May 28, 1941, in which President

Roosevelt designated Secretary of the Interior Harold L. Ickes as petroleum co-ordinator for national defense. On June 4 Secretary Ickes appointed Ralph K. Davies as deputy petroleum co-ordinator.

The OPC functioned after the U.S. entered the war. It was not until Dec. 1942, when the executive order was issued establishing the Petroleum Administration for War to succeed the OPC, that the government oil agency, while by no means given full control over all petroleum matters, received a greater grant of authority. The Office of Price Administration, for example, still continued to establish ceiling prices on petroleum products and was responsible for rationing to civilian consumers.

Secretary Ickes became petroleum administrator and Davies deputy petroleum administrator. The Petroleum Administration for War, with national and district offices and functional committees, was staffed with men who knew the oil business, 90% being drawn from the petroleum industry. The industry and PAW were a closely co-ordinated team—a combined task force. Their government-industry partnership was unique.

PAW acted as a general staff. It gathered data as to future requirements in the United States and elsewhere from the army, the navy, the War Shipping administration, the Office of Defense Transportation and more than 20 other domestic and foreign sources. With the corresponding British organization (British Petroleum office) it analyzed the data and estimated military and essential civilian requirements 18 months or more ahead. It estimated the supplies obtainable from each available source to meet these requirements.

Week by week it revised its estimates and programmed operations to meet new demands, changed conditions and emergencies. Under the guidance of PAW, the program was implemented by industry committees and the industry itself. The strategic Petroleum Industry War council, with William R. Boyd, Jr., president of the American Petroleum institute, as chairman, was composed of executives and association leaders serving voluntarily as individuals representing the industry as a whole. Thus, requirements and supplies were correlated and programmed months in advance and from week to week, and the program was implemented day by day. "The war was not supplied with oil by haphazard improvisation," Deputy Petroleum Administrator Davies told the Special Senate Committee Investigating Petroleum Resources on Nov. 28, 1945. "The operation succeeded because it was planned."

Pre-Pearl Harbor.—The outstanding factor in world petroleum at the outbreak of war in Europe in 1939 was, of course, that of supplying war needs and keeping supply lines open. In all warring and many neutral countries, civilian use of petroleum products was stopped or curtailed.

During 1940 and until the Japanese attack on Pearl Harbor in Dec. 1941, the United States was the great supply source for the Allies' ever mounting requirements of food, planes, tanks and oil—the "arsenal of democracy" under the Lend-lease act.

The U.S. oil industry had been supplying the British with 100-octane aviation fuel and other petroleum products before the United States entered the war. It had put the first commercial 100-octane gasoline plants into operation in 1938 and was producing alkylate, a much-needed aviation gasoline ingredient, in quantity.

After 1940 through conversion and new construction the oil industry's production of aviation gasoline and its in-

gredients increased many times. In the battle of Britain the R.A.F. pilots fought with 100-octane fuel; the nazis had 87. English fliers turned back the invaders with planes which had the extra rate of climb, higher speed, greater manoeuvrability possible with the higher octane fuel. This fuel made possible the construction of an aeroplane which could fly one-fourth farther on a given amount of 100-octane gasoline than on 87. Of 2 big bombers flying to a target 1,000 mi. distant, the one using 100-octane fuel could carry 5,000 lb. more bombs than the one burning 87-octane. The extra power available from higher octane fuel could similarly be spent on some combination of air-fighting advantages, such as additional armour, higher ceiling, greater agility in "dog fighting" and shorter take-off.

In the United States, war construction was rushed on toluene for explosives, and later on butadiene for synthetic rubber, and many less known petroleum products of great importance to the armed forces.

Tankers in "Battle of the Atlantic."—Before Pearl Harbor, the axis waged fierce submarine warfare in the Atlantic against Britain's and the U.S.S.R.'s lend-lease supply lines, concentrating its attack against tankers, for these ships were moving vital oil power for planes, tanks and other instruments of combat to the European war fronts. The toll taken by Hitler's numerous and powerful U-boats was so heavy that U.S. tankers were diverted to British use, resulting in a shortage of gasoline and fuel oil in the Atlantic seaboard states.

After Pearl Harbor and the U.S. declaration of war against Japan, Germany and Italy, the "battle of the Atlantic" took on new fury. Again tankers were the special targets of axis submarines, and U.S. oil companies turned their fleets of ocean-going tankers over to the U.S. maritime commission. These vessels were still operated by the companies but under orders of the navy department.

Gasoline and fuel oil rationing in the United States was inaugurated in 1942.

To meet essential home and industry needs and the war shipments overseas, railroad tank cars were mobilized from oil field and refinery to the east coast in an organized shuttle; westbound pipe lines were reversed, new ones built; oil barge lines were operated and expanded on inland waterways. For further relief and expanded supply, the War Production board in June 1942 approved the construction of a "big-inch"—24-inch—pipe line, the largest diameter oil pipe line on record—to run from Texas to Norris City, Ill., and later extended building authorization to the New York-Philadelphia refinery areas, (see below.)

Nazi Oil Conquests.—By military conquest or control, Germany had added vast sources to its own total annual natural petroleum home production of 4,438,000 bbl. (and an unknown stepped-up output of synthetic fuel) by the end of 1942. When Hitler took Czechoslovakia and Poland in 1939, having previously occupied Austria, he added an annual oil production of 4,100,000 bbl. He added France and Hungary in 1940 (about 3,000,000 bbl.) and Rumania in 1941 (38,000,000 bbl.). Italy had a small production of 46,000 bbl. and added Albania, 1,400,000 bbl., in 1941. In 1942, the Maikop-Kutan field in the soviet union, with an annual production of 17,000,000 bbl., was taken. Thus, the petroleum production under German-Italian control totalled about 68,000,000 bbl., much of which was available because there had been only desultory destruction by the Allies.

However, during those three years of the war, Hitler drew heavily upon the oil reserves built up in preparation

for the Nazi blitz. The bulk of the increased demands for petroleum products created by his augmented mechanized armies, air fleets and sea craft had to be met by increased production of synthetic fuels and oils from coal. And as the year 1942 closed, Hitler's drive for Russian and middle eastern oil had stalled. The high barrier of the Caucasian mountains still lay between the farthest advance of the Nazi Wehrmacht and the rich Baku oil fields in the U.S.S.R. and the equally rich oil fields in Iran and Iraq.

Although Iraq passed under the control of the Allies in 1941, oil shipments from that country to the Mediterranean were not resumed after the British occupation because of the difficulty of Mediterranean oil transportation. On the other hand, the Iranian oil fields furnished increased amounts of oil because shipment could be made southward by way of the Persian Gulf.

Japan's Oil Conquests.—The score of oil conquest by the new axis partner, Japan, was highly impressive in 1942. Japan's domestic production was insignificant—2,659,000 bbl. in 1941. By the conquest of the Netherlands East Indies, Burma, Sarawak and Brunei, it gained control of countries having a total annual oil production of 68,366,000 bbl., although Japan was unable immediately to secure from these fields a production as large as that because of the demolition of wells, refinery equipment and the like.

U.S. victories in the Pacific powered by an air-sea team of battle fleets and aircraft carriers demonstrated the tremendous importance of oil supply. U.S. task forces dealt staggering blows to the Japs in the Marshalls and elsewhere, covering great distances from their naval bases.

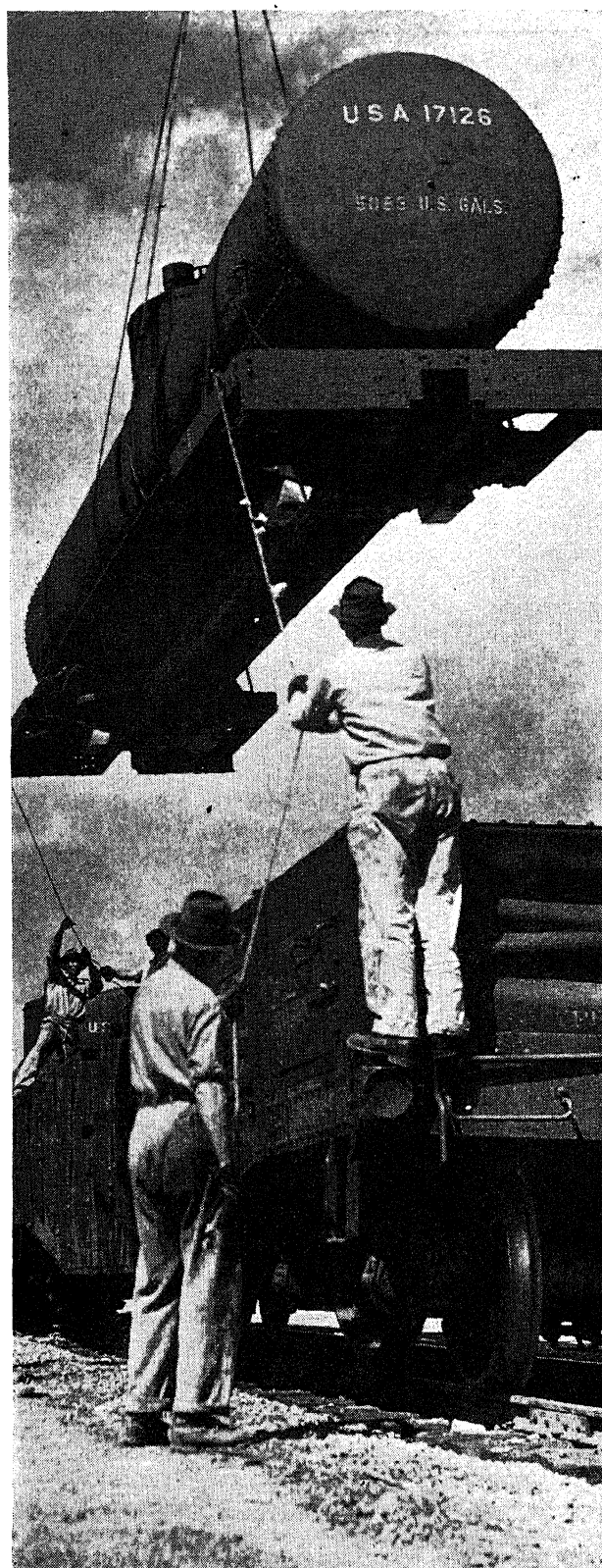
As the war against Japan advanced, superior U.S. plane and gasoline power accounted for Japanese plane losses at the ratio of 11 to 1, as compared with the United States.

It was a titanic battle of lengthening supply lines, as the Japanese were successively rolled back and stripped of island defenses.

Allies Retake Oil Fields.—In 1943 Russian armies not only successfully defended the Caucasian oil fields and wrested Maikop from German hands, but by the end of the year were pressing axis forces toward the Polish and Rumanian borders, thus putting the oil fields of those countries, which were the only large sources of natural petroleum within the home and conquered territories of Germany, within striking distance of air forces.

Of no less strategic importance was the successful Allied campaign in North Africa and Sicily, which cleared the Mediterranean and shortened the supply lines of the Allied armies. Coupled with the successes attained against German submarines in the Atlantic, these campaign results meant a virtually uninterrupted flow, with very little loss, of oil to the armies and navies of the United Nations and to the war industries of Britain. The Russian and African successes also removed the threat of invasion or partial blockade existing against the Iraqi and Iranian oil fields, giving the United Nations a chance to draw more heavily upon these sources.

Miracle of 100-Octane Gasoline.—Only a few decades before, 100-octane gasoline had been a laboratory experiment which cost \$30 a gallon to make. As the war continued, 100-octane was being made at a cost only a few cents higher than that of motor gasoline. The base was gasoline made from highly selected crudes. To this was added synthetic blending agents which increased the anti-knock rating of the base stock. In addition, tetraethyl lead was employed to increase even more the anti-knock rating of the finished product. Thus a superfuel was developed which was actually well beyond the anti-knock rating of pure iso-



Loading a gasoline tank car at Camp Pickett, Va., assembly depot for shipment to embarkation point and thence to war fronts. The tank had a capacity of 5,083 gallons

octane, from which 100-octane gasoline obtained its name.

In May 1941 there were 16 plants in the United States equipped to make 100-octane; and 4 in the rest of the Allied and neutral world. Their combined daily capacity was about 44,000 barrels.

By the end of the year, there were 73 100-octane plants

in the United States, 10 in Allied countries, 4 under construction in the Soviet Union and more being built when V-J day came. Some 400 other refineries and natural gasoline plants in the United States contributed base stock, components or other factors to the aviation gasoline program.

Each year's output more than doubled that of the preceding year. Output for 1944 was greater than all preceding years together. Output for March 1945 was 525,000 barrels a day in the United States and more than 600,000 barrels in the United Nations excluding the U.S.S.R., an increase of 1,265% over the world's total capacity in May 1941.

Oil for Synthetic Rubber and Toluene.—With the conquest by Japan of the Netherlands Indies, from which the United States secured more than 90% of its natural rubber, motor-dependent U.S. faced one of its most serious problems—rubber scarcity. The U.S. petroleum industry, however, knew how to get butadiene from petroleum, one of the principal components of buna S (synthetic) rubber. Butadiene is a gas which under pressure becomes a liquid and is produced from butane and butylene, both oil products. It may also be made from alcohol.

It became the U.S. oil industry's job to provide the butadiene to produce synthetic rubber in tremendous volume, to meet the growing military needs and to keep the domestic economy functioning.

Huge plants for making butadiene from petroleum products were built and operated by the oil companies under the government's synthetic rubber program, and by 1944 U.S. rubber plants were producing at a rate nearing 800,000 tons of synthetic rubber annually, with synthetic rubber going into tires for trucks, tanks and jeeps, linings for bulletproof gas tanks and many other items.

For bombs, torpedoes and shells, the basic explosive used was T.N.T. made from toluene. Toluene was a rare and expensive substance during World War I, when most of it was a by-product from the coking of coal. So great were the demands of the Allies in World War II for T.N.T. they could never have been met from coke-oven sources. Fortunately a way had been found to make toluene from petroleum. Toluene plants were built under government program. Pure toluene was turned out from petroleum refineries in great quantities. Tri-nitroglycerin and picric acid explosives were also made from petroleum.

In the production of toluene, the charge used is a straight run gasoline extracted from crude oil. This is run into a series of fractionating columns where the toluene is extracted. The product was delivered to T.N.T. producing plants and eventually found its way into the bombs and shells.

Bombing of Axis Oil Facilities.—The year 1944 was one of increased crisis for Germany because of military events affecting its oil supplies. Resurgent Soviet armies wrested from Germany its main sources of natural petroleum, leaving it dependent on stored reserves and synthetic fuel production from coal. With the advance of the Allied armies through France and the establishment of air bases on the continent, German synthetic oil plants were subjected to intensive bombing. By the end of 1944, reports multiplied that the Nazi war machine was experiencing difficulties because of oil shortage and poor quality of available oil supplies.

"The U.S. 8th Air Force," according to Lt. Gen. James H. Doolittle, its commander, "used 88,800,000 gal. of aviation gasoline in March 1945, an average of almost . . .

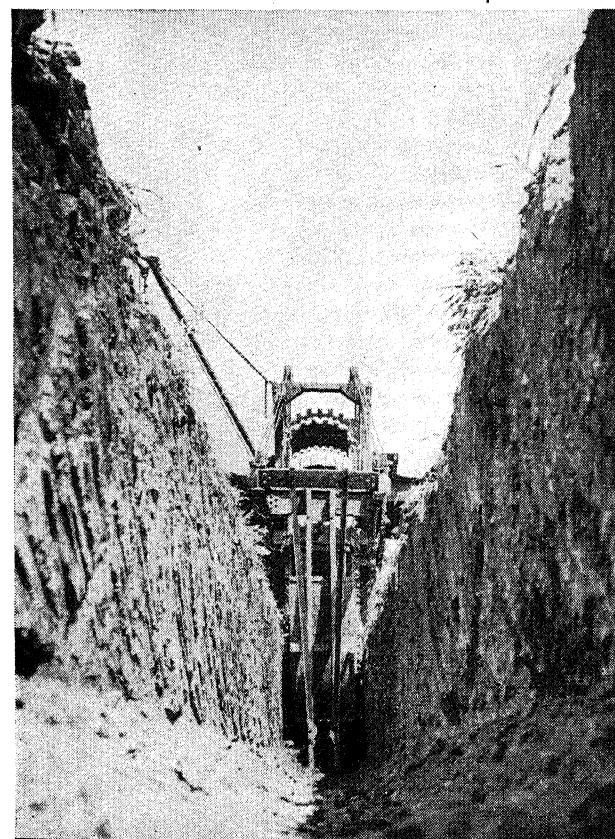
3,000,000 gal. per day. The building up to this peak production actually provided the fuel which set fire to and devastated a great part of Hitler-held Europe. From May 1944 to April 1945 the 8th Air Force, together with the 15th Air Force and the R.A.F. Bomber Command, undertook and succeeded in destroying the German oil industry. The 8th destroyed the 7 large synthetic plants in central Germany: the largest plant at Politz on the Baltic—and the 20-odd refineries in Germany. The 15th concentrated on the Silesian plants and the major refineries of Rumania, Austria, Hungary and Czechoslovakia, while the R.A.F. took on the destruction of the 10 large plants in the Ruhr.

"In this period of 11 months, the 3 air forces dropped more than 200,000 tons on synthetic plants, refineries and benzol plants; 555 separate attacks were made on 133 targets. In addition, more than 35,000 tons of bombs were dropped on reserve oil depots and dumps supplying the German armies, navy and air force. Of this gigantic total, the 8th made 222 attacks on 66 producing plants, dropping 67,000 tons—and sent another 15,000 tons into depots and dumps.

"The result of this combined effort was truly devastating, for by April 1, 1945, every known synthetic plant and major refinery in Axis-held territory had been attacked and every one of these had been put out of production at one time or another. Production at one time was reduced to 7 per cent of normal. First strategic and then tactical reserves were used up. Then, the mobility of the great Wehrmacht was impaired to the point where our troops had an overwhelming advantage—out of all proportion to numbers and equipment."

Destruction of oil facilities proved equally effective in the war against Japan. Allied submarines had cut the Netherlands Indies oil supply lines. Prior to V-J day, Japanese home island rates of production of petroleum

Excavation for the "Big Inch" petroleum pipe line, connecting Longview, Tex., and the eastern states. The line was completed in 1943



products had been reduced to 65% of requirements at the July 1945 monthly rate of consumption. Air attacks had put out of operation 100% of Japan's high-grade lubricating oil capacity.

While the Japanese had a considerable surplus of refining capacity at the end of the war, B-29 attacks during 1945 against 11 of the largest and most modern refineries in the home island had, nevertheless, rendered these refineries useless. Japan's inability to ship oil from the East Indies islands had also given it a large excess oil storage capacity, but air attacks reduced that capacity by nearly 6,000,000 barrels.

War Pipe Lines in U.S.—When the war began there were roughly some 126,000 mi. of pipe line in the United States. Much of this system had to be rearranged and systematized to permit it to meet wartime requirements. The direction of flow of hundreds of miles of pipe line was reversed. Old pipe was dug up, salvaged and relocated. Several hundred miles of natural gas pipe lines were converted to oil service.

In record time, some 3,400 mi. of new pipe lines were built to transport millions of gallons of both crude oil and refined products which could not have been transported by tank cars or tankers.

These new pipe lines ranged from the "Big Inch" and the "Little Big Inch" line—a 20-in. war emergency pipe line for refined products also from Texas to New York—to smaller but important lines in various parts of the country.

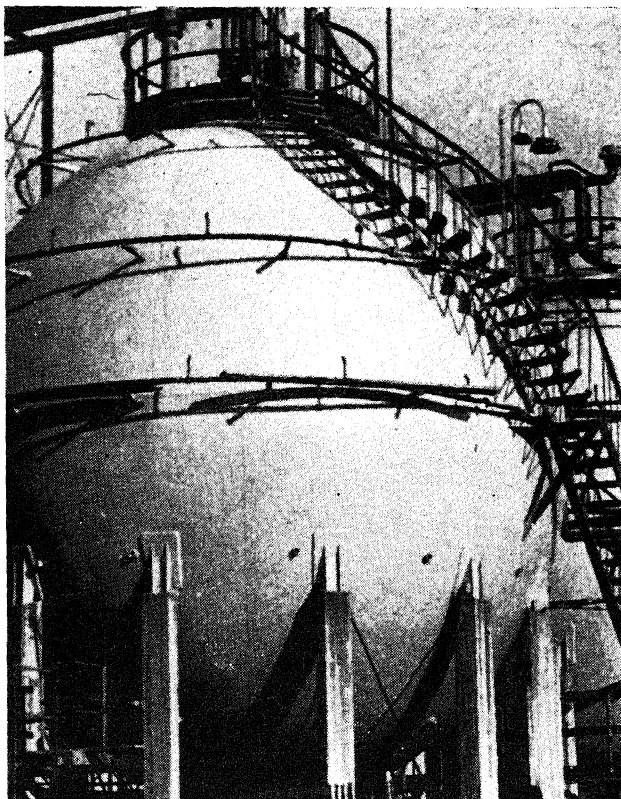
The "Big Inch," built with government funds by oil pipe line people and operated as a co-operative enterprise in which leading oil companies shared, began operating to Norris City, Ill., and to New York. A total of around 260,750,000 barrels of crude oil had been pumped through this line up to V-J day.

The "Little Big Inch" provided for overland transportation of finished petroleum products from the southwest to the New York harbour area terminals, 1,475 mi., from Beaumont, Texas, with a rated capacity of 235,000 barrels of gasoline daily. Actual construction was started in April, and the line was completed in Dec. 1943 at a cost to the government of more than \$67,000,000. Because of extensive testing, deliveries to the east coast were not started until March 1944. Up to V-J day, this line had delivered to the Linden, N.J., station a total of about 107,125,000 barrels of products.

These two lines, together with the southwest emergency pipe line, Ohio emergency pipe line, Plantation pipe line extension and Florida emergency pipe line provided facilities capable of delivering a total of approximately 632,000 barrels per day to the eastern seaboard for shipment abroad and for vital domestic industrial and home needs.

Although quick development of petroleum transportation facilities to the east coast was of paramount importance, it was also essential that pipe lines be constructed from oil fields in west and southwest Texas, Louisiana, Mississippi, the Rocky mountain states and California to deliver crude oil to refineries or terminals in the same general areas or in the middle west. Included in the 9,930 mi. of new lines constructed under the nation-wide wartime program were the 6 government-financed projects previously named and 29 major projects privately financed by industry, each of which cost \$500,000 or more.

Ocean Tankers.—When the Big Inch lines were being built, the tanker construction program appeared hopelessly stymied for lack of steel. Later, large-scale construction was resumed and, although there were interruptions, new tankers were coming off the ways right down to the



One of the 13 steel hortonospheres used in the production of synthetic rubber at the Polymer plant in Sarnia, Ontario

end of the war.

Despite all losses, the U.S. tanker fleet increased during the war from 217 ships totalling 2,530,000 dead-weight tons to 763 ships totalling 11,406,000 tons, an increase of 250% in number of ships and 350% in tonnage.

These tankers also showed a marked increase in size as well as in numbers. At the start of the European war the tankers of the United Nations averaged 10,000 dead-weight tons each; at the end of the war they averaged nearly 12,500 tons.

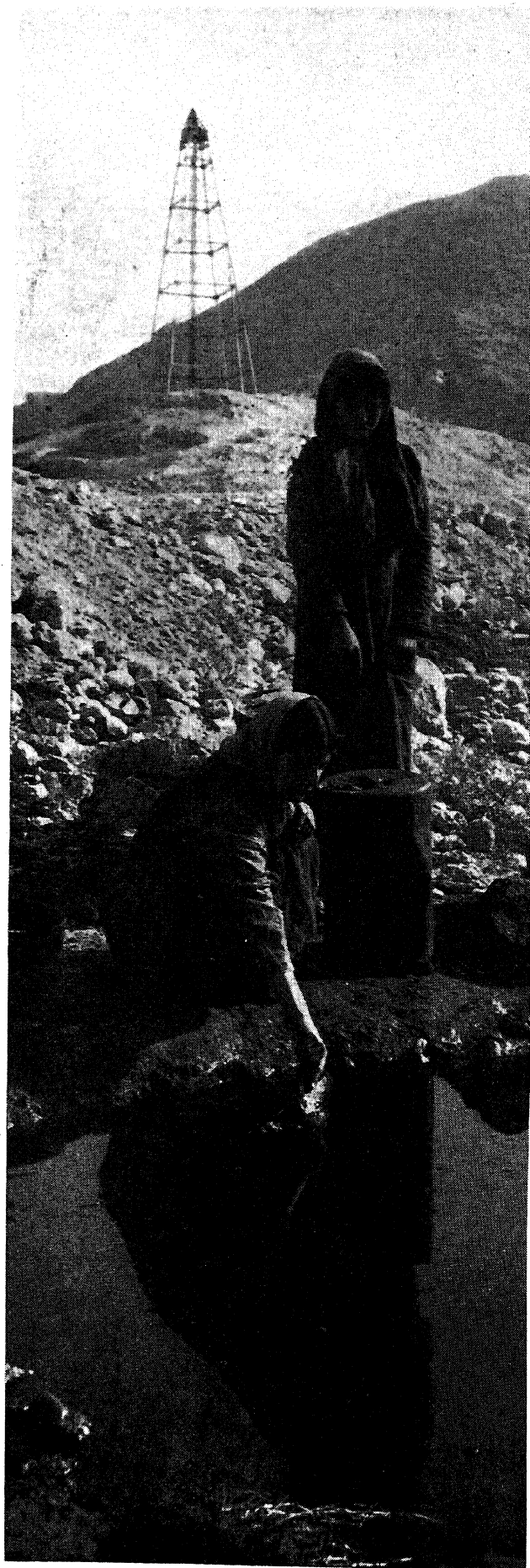
If the Pacific war had continued, however, tanker space would soon have been critical again, according to Deputy Petroleum Administrator Davies.

Revival of Oil-Shortage Scare, 1943-44.—There was a revival of the oil-shortage scare in 1943-44 reminiscent of that immediately following World War I. It centred, as did the earlier one, on the heavy drain being placed on U.S. oil to meet military requirements, and on fear for national security.

Petroleum Administrator Ickes announced the formation of the government-sponsored Petroleum Reserves corporation, in Nov. 1943, chartered to construct foreign refining and pipe-line facilities, and otherwise to engage in world-wide oil operations.

He said that, since government assistance and participation in foreign oil development might be necessary for U.S. companies "from now on, the Petroleum Reserves Corporation is available for this purpose." Directors named were the secretaries of state, war, navy, and interior and the administrator of the Foreign Economic administration.

Early in 1944, announcement was made of a projected Arabian pipe line sponsored by the Petroleum Reserves corporation under a proposed agreement between it and the Arabian-American Oil company and the Gulf Exploration company. Under this agreement, the government



upon "recommendation of the War Department, Navy Department, Joint Chiefs of Staff, and the Army and Navy Petroleum Board and with the approval of the Department of State" agreed "to construct and to own and maintain a main trunk pipe-line system, including requisite facilities, for the transportation of crude petroleum from a point near the presently discovered oil fields of Saudi Arabia and Kuwait to a port at the eastern end of the Mediterranean Sea," the companies maintaining and operating the line.

After wide public discussion of the proposed project, it was dropped by the middle of 1944, and the project as proposed did not materialize. The Petroleum Reserves corporation never functioned and was later absorbed by another government corporation.

Anglo-U.S. Oil Agreement.—Further attention was given to U.S. oil participation abroad in proposals for an Anglo-American Oil agreement. In July 1944, representatives of the British government met with those of the U.S. government in Washington in a series of oil conferences that resulted in the promulgation of an Anglo-U.S. oil agreement dated Aug. 8, 1944. The agreement was "to assure the orderly development of petroleum resources for international trade and to provide the basis for a multilateral world-wide oil accord in the postwar era." It was signed by the state department, Edward R. Stettinius, Jr., acting secretary, and by Lord Beaverbrook, lord privy seal.

President Roosevelt submitted the agreement to the senate in the form of a treaty for ratification on Aug. 24, 1944. After wide discussion the agreement was withdrawn by the president from the senate for further study. Revisions were made and a new Anglo-U.S. oil agreement, also designed to form the basis of a multilateral agreement to which other countries could affix their signatures, was signed Sept. 24, 1945, in London by U.S. Petroleum Administrator Ickes and Great Britain's Fuel Minister Emanuel Shinwell. Late in 1945, President Truman submitted this agreement to the senate for approval as a treaty. No further action was taken in 1946.

War Drain on U.S.—World War II caused a heavy drain on the oil fields of the United States. One-fifth of all the oil ever produced in the United States came out of the ground during the war. In May 1941 average daily production of crude oil was 3,772,000 barrels. In May 1945, after 4 years of unprecedented withdrawals, the daily average was 4,859,000 barrels, an increase of 29%.

Such a sustained rate of production was possible only because the United States entered the war with a large reserve of productive capacity, the result of earlier years of successful exploration and of increased practice and enforcement of the principles of oil conservation. In the summer of 1944, however, production overtook maximum efficient productive capacity. Thereafter it was necessary, in order to meet war needs, to produce some of the best fields in the country above their maximum efficient rates.

U.S. crude oil production, producing wells, wells drilled and exploration holes drilled are shown in Tables I and II.

World Production During War.—World production, exclusive of the United States, the U.S.S.R. and the areas formerly controlled by the axis, increased by 41% from May 1941 to May 1945, compared to 29% for production in the United States.

"Some people have wondered why even more oil was not taken from foreign fields and less from home sources,"

Housewives in Iran scooping up oil for domestic use, at the Masjid-i-Sulaiman field. This field was so rich in oil that puddles such as this one were formed by seepage to the surface

Table I.—Crude Oil Production in the United States, and Number of Producing Oil Wells

Year	Yearly Totals (Barrels)	Daily Averages (Barrels)	Producing Oil Wells (End of Year)
1937	1,279,160,000	3,505,000	363,030
1938	1,214,355,000	3,327,000	369,640
1939	1,264,962,000	3,466,000	380,390
1940	1,353,214,000	3,697,000	389,010
1941	1,402,228,000	3,842,000	399,960
1942	1,386,645,000	3,799,000	404,840
1943	1,505,613,000	4,125,000	407,170
1944	1,677,753,000	4,584,000	411,000 (estd.)
1945 (estimated)	1,729,000,000	4,737,000	...

Sources: Production and number of wells from bureau of mines, U.S. department of interior 1937-44; 1945 estimates of production from P.I.W.C. long term report dated March 1, 1945.

Table II.—Total Number of Wells Drilled Each Year in the United States, and Exploratory Holes Drilled (Oil—Gas—Dry Holes and Water Intake)

Year	Oil Wells	Gas Wells	Dry Holes	Water Intake	Total	*Exploratory Holes
1937	22,386	2,676	6,560	1,453	33,075	2,224
1938	18,598	2,066	6,141	688	27,493	2,638
1939	17,625	2,198	6,474	1,420	27,717	2,589
1940	19,125	2,352	6,617	1,947	30,041	3,038
1941	19,552	3,007	7,128	2,366	32,053	3,264
1942	10,492	2,068	5,504	1,760	19,824	3,212
1943	9,717	1,782	6,385	1,547	19,431	3,843
1944	13,028	3,067	7,009	2,156	25,260	4,796

Sources: Oil & Gas Journal and American Petroleum Institute.

*Included in total number wells drilled—from Dr. F. H. Lahee, Sun Oil company, and Bulletin of the American Association of Petroleum Geologists.

Deputy Petroleum Administrator Davies told the Special Senate Committee Investigating Petroleum Resources in 1946. "The reasons were purely physical and geographical and never in any sense nationalistic. Foreign fields carried as much of the war load as their productive and refinery capacity, available pipe-line outlets, and location with respect to points of need permitted. Our efforts to increase available foreign output received the wholehearted cooperation of the British and the nations in which the fields are located. At no time was there the slightest holding back of our allies, the slightest reluctance to develop or deplete fields that they control.

"In the early stages of the war the enemy, not our allies, forced disproportionate drafts on our domestic fields in comparison to those abroad. During the closing months of the war, however, the situation was reversed and our domestic fields could not meet even our own world-wide needs—the needs of our forces overseas and our essential domestic use. Our military, maritime and domestic consumption, not including lend-lease or other supplies to our allies and others, was greater than our domestic production. Without foreign oil and revenue lend-lease we should have fallen short, before V-J day; of meeting our own home and overseas requirements."

World oil production by countries 1937-44 is shown in Table III.

War Impact on Refining.—The war's impact on refining,

both in the United States and elsewhere, was as great as that on production. Refinery crude runs in the United States increased 31% from the average in 1941 to V-J day. Foreign runs increased twice as much—62%—in the same period.

With the help and supervision of PAW, nearly \$1,000,000,000 worth of new refining facilities were built in the United States, including great catalytic cracking units costing millions of dollars and smaller units in dozens of plants from coast to coast. These units turned out huge volumes of high-octane base stock and blending components for military and aviation gasoline, butadiene for synthetic rubber and toluene for explosives, and contributed heavily to the increased output of motor gasoline, kerosene and fuel oils. Roughly, \$260,000,000 was spent for similar refining facilities outside the United States. Except for a refinery in Saudi Arabia and two plants in the United States, the new facilities were incorporated into pre-existing plants.

Removal of Wartime Controls.—The Petroleum Administration for War was terminated on May 8, 1946, by the president's executive order of May 3. In liquidating this war agency and its emergency powers, the president indicated that it had successfully discharged its grave wartime responsibilities.

Commenting upon the action, Deputy Petroleum Administrator Davies said: "The undertaking, unparalleled in the annals of Government and industry, was carried to successful conclusion through the spirited cooperation and harmonious relationship that prevailed between Government and industry.

"All those who participated, on both sides, can rest in the knowledge that they contributed vitally to the defense of their country in its hour of peril."

Throughout the war, crude oil and petroleum product prices were virtually frozen at 1941 prices under OPA ceilings. Average annual prices of crude oil, gasoline and furnace oils 1937-45 inclusive are shown in Table IV.

Under the new price control law signed by President Truman on July 25, 1946, crude oil and all petroleum products were entirely free from price control, and future control depended upon future findings of the new Price Control board. The national average price of crude oil on June 30 of about \$1.33 per barrel, was increased 25 cents late in July 1946, and there was a general increase of slightly more than 1 cent a gallon in the gasoline retail price.

Table III.—World Crude-Oil Production, by Countries and Years, 1937-44 Inclusive* (Barrels of 42 U.S. gal. daily)

(barsils of 42 U.S. gal. daily)																			
Year	Ru- mania	United States	Italy	Canada	Russia	Pol- and	Japan and Taiwan	Ger- many	India	Bur- ma	Dutch East Indies	Peru	Mexico	Argen- tina	Trini- dad	Egypt	British Borneo	Iran (Persia)	
1937	145,625	3,504,548	314	6,368	555,951	10,090	6,835	8,697	5,929	21,433	145,843	47,854	127,918	44,811	42,474	3,081	15,466	212,548	
1938	134,050	3,327,000	291	17,521	579,596	10,232	8,806	10,587	6,679	20,663	148,025	43,391	104,874	46,784	47,463	4,550	17,756	213,737	
1939†	127,141	3,465,649	241	20,664	600,718	9,058	6,471	12,823	6,375	21,570	160,554	37,007	117,203	50,999	53,541	12,796	19,388	202,611	
1940	116,789	3,697,306	224	23,078	624,000	9,600	6,331	19,433	7,500	21,795	159,821	33,134	119,982	56,314	58,000	17,788	19,619	178,628	
1941	109,749	3,841,721	225	26,957	647,000	8,950	6,300	20,000	8,000	20,959	149,918	32,702	117,488	60,315	60,000	23,343	13,731	138,704	
1942	105,822	3,799,027	225	27,697	625,000	11,300	6,438	20,000	7,500	3,562	43,973	37,338	95,113	64,942	65,000	22,241	5,000	199,433	
1943	100,000	4,118,290	225	26,447	675,000	10,000	6,100	18,000	7,000	2,500	144,000	40,149	95,595	68,063	60,000	24,596	15,000	212,000	
1944	63,000	4,584,025	110	26,580	700,000	10,000	6,000	17,000	9,500	2,500	70,000	39,307	103,863	66,205	60,000	25,850	10,000	280,000	

Year	Vene- zuela	Ecu- ador	France	Czecho- slo- vakia	Great Britain	Colom- bia	Sak- halin	Boli- via	Iraq	Aus- tria	Bah- rein	Al- bania	Hun- gary	Saudi Arabia	China	Yugo- slavia	Other coun- tries	Total foreign	Total world
1937	511,934	6,013	1,367	337	54,944	9,300	203	88,000	572	21,267	1,603	55	908	1,370	.....	.....	...	2,096,832	5,601,380
1938	521,841	6,264	1,364	397	58,925	9,315	250	88,877	1,089	22,734	2,315	3,069	10,778	.....	.....	.....	...	2,128,654	5,455,654
1939†	562,829	6,461	1,370	326	88,643	10,601	589	82,079	2,580	20,791	3,027	5,339	14,000	.....	.....	.....	...	2,228,578	5,694,227
1940	508,562	6,532	1,037	500	358	69,136	11,270	647	51,498	6,508	19,388	4,000	8,944	11,800	.....	.....	...	2,170,811	5,868,117
1941	625,017	4,385	1,350	525	632	66,816	12,000	644	31,632	12,000	18,600	3,507	8,944	11,800	.....	.....	75	2,234,268	6,075,989
1942	405,436	6,418	1,350	575	1,656	28,732	11,000	844	51,570	16,000	17,100	4,775	13,500	12,400	1,000	1,000	28	2,193,968	5,712,995
1943	491,505	6,518	1,500	600	2,298	36,316	11,000	1,082	74,430	24,000	18,000	2,500	15,500	13,000	2,700	1,500	142	2,207,266	6,325,556
1944	702,278	8,107	1,400	550	1,912	60,904	10,000	833	86,899	32,500	17,000	.....	16,500	21,268	1,500	2,000	175	2,453,741	7,037,766

*Bureau of mines and private information.

†Commencing in 1939 figures for many countries in the eastern hemisphere reflect assumed approximations because of war restrictions.

Table IV.—Average Price of Crude Oil, Gasoline and Furnace Oils in U.S.

Year	*Crude Oil Per Barrel (at wells)	Includ'g Tax	†Gasoline Per Gallon (50 cities average) Exclud'g Tax	Tax	‡Furnace Oils Per Gallon
1937	\$1.18	19.99¢	14.58¢	5.40¢	7.11¢
1938	1.13	19.51	14.07	5.44	6.77
1939	1.02	18.75	13.31	5.44	6.57
1940	1.02	18.41	12.75	5.66	6.88
1941	1.14	19.23	13.30	5.93	7.11
1942	1.19	19.95	13.98	5.97	7.39
1943	1.20	20.05	14.08	5.97	7.69
1944	1.22	20.17	14.20	5.97	7.66
1945	1.17	20.45	14.48	5.97	\$

*This is the national average annual price per barrel at wells, bureau of mines 1937-42 with 1943 and 1944 estimated. †These are at service stations and exclude extra transportation costs. Compiled by the Texas company and the American Petroleum Institute. ‡Weighted average prices for various cities as published by the bureau of labour statistics,—weighted on a fuel oil consumption basis, exclusive of extra transportation costs. §Not available.

U.S. Oil Investment Abroad.—There was scarcely a country in the world where U.S. oil companies had not made investments directly or through subsidiaries or affiliates, according to the report of the Group on American Petroleum Interests in Foreign Countries to the Special Senate Committee Investigating Petroleum Resources. Although totally excluded with other foreign nationals from the U.S.S.R. and from participating in producing operations in certain other countries, they were represented in marketing activities in virtually all countries except the soviet union.

Of the total assets employed at the end of 1939 of nearly \$2,500,000,000, \$876,000,000, or 35%, was in exploration and production; nearly \$791,000,000, or 31%, in marketing; more than \$365,000,000, or 15%, in refining; about \$145,000,000, or 6%, in transportation; and \$322,000,000, or 13%, in "all others." U.S. petroleum investment abroad is shown in Table V.

Table V.—Total Investment of U.S. Petroleum Interests in Foreign Countries by Hemispheres (In thousands of dollars)

Year	Western Hemisphere				Eastern Hemisphere				Total Foreign	
	Amount	% vs. 1919	% total	Amount	% vs. 1919	% total	Amount	% vs. 1919	Amount	% vs. 1919
1919	179,689		45	219,742		55	399,431			
1929	778,615	333	55	627,399	186	45	1,406,014	252		
1939	1,355,376	654	54	1,143,881	421	46	2,499,257	526		
1944	1,685,894	838								
1945	Not available.									

Source: Report of Group on American Petroleum Interests in Foreign Countries to Special Senate Committee Investigating Petroleum Resources, 1945.

Postwar Nationalization Trend.—The postwar trend toward complete national monopolies at the expense of foreign oil interests in many European and Latin-American countries was as pronounced if not more so than before World War II.

Substantial interests of the U.S., British and Dutch petroleum industries were located in European and far eastern theatres of war—in parts of the war-torn areas of Finland, Germany, Rumania, Austria, Hungary and Poland, and also in the Netherlands Indies. Some of these properties had been damaged or destroyed and were located in territories that either had experienced or might experience a change of sovereignty.

Prospects for restitution of losses in World War II were clouded by the political complexion of successor governments in both victor and vanquished countries, many of whom inclined toward nationalized economies. A further complication was the separate armistices concluded, terms of which, involving war-loss settlements, were being fulfilled in advance of a general peace treaty.

Russian Expansion.—Russian military victories gave the soviet union control of many central and southeastern European countries or parts of such countries. Some had petroleum production, and all had contained investments by U.S. and other foreign oil companies. Under the

guise of reparations paid for out of war booty, the U.S.S.R., making an interpretation of the Yalta, Moscow and Potsdam agreements not shared in by the United States and Britain, seized or placed under its own control considerable oil industry property in those countries. Also, by throwing up an iron barrier from the Baltic to Trieste on the Mediterranean, the soviet made direct bilateral trade agreements which seemed to exclude U.S., British, Dutch and French oil interests from an area of large markets in which they formerly operated. In certain of these countries, joint soviet and national oil companies were formed.

Included under soviet control were Rumania, Poland, Hungary and Austria, accounting for some 120,000 barrels of oil production daily—practically all the oil of Europe outside of the U.S.S.R. itself, except an insignificant amount produced in England, Italy and in the Hanover basin of Germany, under British control. Also within the U.S.S.R.'s "sphere" were most of the plants and raw materials of the large synthetic fuel industry developed by the Germans to an output level of about 100,000 barrels daily at the start of World War II. As noted, these plants were prime targets for Allied bombing raids and suffered considerable damage, but reports in 1946 indicated that the more important plants—at Blechhammer, in what was Polish territory, at Brux in Czechoslovakia and at Leuna in the Leipzig area—were being restored and represented a potential supply of from 20,000 to 25,000 barrels daily. Raw material for these plants was brown coal or lignite, the bulk of which was found in the eastern German, Polish, Czech and Hungarian basins in which the plants were located.

Early in 1946, the U.S.S.R. delayed withdrawing its military forces from Iran past treaty date, precipitating the first United Nations Security council test. The subsequent compromise reached, involving its agreed withdrawal, was to be followed by the formation of an Iranian-Russian oil company (in which the soviet union started with a 51% interest for the first 25 years) controlling a large area for oil exploration and development in northern Iran.

World Reserves.—World crude-oil reserves, excluding Russian, were estimated in 1946 at nearly 60,000,000,000 barrels, 4 times the reserves estimated in 1937, despite the greatly stimulated consumption during World War II. Estimated world oil reserves are shown in Table VI.

Large oil-promising sedimentary areas had been only partly explored or were still untouched. The potential-

Table VI.—Oil Reserve Estimates (In thousand barrels)

As of Jan. 1	United States	Outside United States	As of Jan. 1	United States	Outside United States
1937	13,063,400	11,727,218	1942	19,589,296	24,058,823
1938	15,507,268	14,278,582	1943	20,082,793	23,920,743
1939	17,348,146	21,822,424	1944	20,064,152	31,431,522
1940	18,483,012	21,801,986	1945	20,453,231	43,319,800
1941	19,024,515	22,440,983			

Sources: U.S. estimates are for "proved petroleum reserves" scientifically calculated by experts and published by the American Petroleum Institute. Foreign data are not as accurately or scientifically calculated, and are from best available private sources. Inasmuch as the U.S. and "Outside U.S." figures are not calculated on the same basis the annual calculation for "total world reserves" has been omitted. The information for 1944 is a combination of private information, PAW information, and the estimates submitted by E. DeGolyer after the visit of his mission to the near and middle east. For 1945 the data were taken from the paper presented by J. T. Duce at the hearings held before the Special Senate Committee Investigating Petroleum Resources. The latter estimate contains some reserves in the near and middle east that were classified by the DeGolyer mission as "indicated." The estimates from 1937 to 1943, therefore, are not comparable with those of 1944 and 1945. The figures for the earlier period are on a conservative basis because of the lack of complete data and, furthermore, do not include any "indicated" reserves. The principal differences in the estimates for 1943 and 1945 occur in Russia and the near and middle east as shown below (in million barrels):

Year	Russia	Near and Middle East	Others	Total Foreign
1943	2,392	12,503	9,026	23,921
1945	5,735	26,800	10,785	43,320

ties of future discoveries were illustrated by the fact that the United States, where it was believed more oil would still be found than had been consumed, had supplied two-thirds of the world's oil consumption through 1946 and yet contained only an estimated one-seventh of the world's sedimentary areas considered by geologists as promising for oil discovery. (See also CHEMISTRY; GEOLOGY.)

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Petroleum Reserves Corporation

See RECONSTRUCTION FINANCE CORPORATION.

Petrology

See GEOLOGY.

Peyrouton, Marcel

Peyrouton (1888–), French government official, was appointed secretary-general of the government of Algeria in 1930, resident-general of Tunisia in 1933 and resident-general of Morocco in 1936.

After service as ambassador to Argentina he was reappointed resident-general of Tunisia in June 1940, as France was about to surrender. He returned home after the armistice and by Sept. 1940 was Vichy interior minister.

After a bitter quarrel with Pierre Laval, Peyrouton resigned in Feb. 1941; he was then returned to Argentina as Vichy's ambassador, but when Laval returned to Pétain's favour, Peyrouton quit his post.

Gen Henri Giraud's appointment of Peyrouton on Jan. 19, 1943, as governor-general of Algeria was resented by De Gaullists, and Free French pressure forced him to resign on June 1, 1943. On Dec. 21, 1943, he was arrested and imprisoned on charges that he had suppressed French underground groups during his tenure as Vichy interior minister. On Oct. 9, 1944, he was transferred to a prison near Paris to await trial for treason.

Pharmacology

See BIOCHEMISTRY; BOTANY; CHEMOTHERAPY; CHEMURGY; DRUG ADMINISTRATION, U.S.; ENDOCRINOLOGY; INDUSTRIAL RESEARCH; MEDICINE; NARCOTICS AND NARCOTIC TRAFFIC; VITAMINS.

Phenomenology

See PHILOSOPHY.

Philadelphia

Like most older U.S. cities, Philadelphia, Pa., continued to show a decrease in its rate of population growth. The 1940 census gave the city's population as 1,931,334, 1% less than in 1930. On the other hand, population of the Philadelphia-Camden (eight-county) industrial area in 1940 was 3,199,600, 2% more than 1930, but the increase was less than previous decades. Families, however, increased rapidly; 13% in the eight-county area 1930 to 1940, and more rapidly after that year, causing an acute housing shortage.

Military establishments and war industries attracted many migrants; between 1940 and 1944 net migration into

Philadelphia was about 120,000, with an additional 100,000 entering the surrounding seven counties. Many became permanent residents.

The labour force expanded rapidly in the Philadelphia area to meet the emergency of World War II. From an estimated 1,062,000 in April 1940, the number of persons employed in manufacturing alone in the Philadelphia-Camden industrial area rose to about 720,000 during the peak in Nov. 1943. In July 1945 total employment in that area was about 1,220,000, of which 554,000 were in manufacturing. Reconversion produced no serious employment problem; although there was a slight drop immediately after the war, reconverted plants and the service establishments rapidly took up the slack. From an estimated 662,000 in April 1940 and 664,000 in July 1945, non-manufacturing employment in the area rose to about 750,000 in May 1946.

The diversity of Philadelphia's activities—particularly the balance between trade and industry and between manufacture of durable and non-durable goods—enabled the city to weather depression, war and reconversion with minimum disturbance. The ups and downs of one group of industries did not seriously disturb the economic status of the city as a whole. Of all types of manufacturing listed by the U.S. census, the Philadelphia-Camden industrial area had 351 types, or 85%. About two-thirds of its manufacturing personnel normally makes non-durable goods; such industries were less subject to cyclical disturbances than durable goods industries.

Philadelphia was a leading centre of war production; the total value of products in the city alone in 1943 was \$3,240,000,000. Wartime expansion of industries in the area was generally not of the spectacular type, but more stable. Increased production resulted from intensification of activity in prewar plants as well as new plants. Most of the modern spacious plants built for war remained in use; industries moved into them from more crowded older facilities during the postwar period.

The port of Philadelphia held its position as second U.S. port, but with noteworthy increase in tanker traffic, serving oil refineries along the Delaware and Schuylkill rivers. In 1939 tankers accounted for about 70% of tonnage, though general cargo remained important. In 1936 Philadelphia handled 6.78% of total U.S. port traffic; in 1941 exactly the same percentage. Submarine warfare and ship diversion reduced coastwise traffic, although foreign traffic held up. Philadelphia was the principal Atlantic port for wartime neutral shipping, handled large lend-lease shipments and was the major loading port for munitions.

Physical growth of the city and environs, retarded during the depression, was resumed in the prewar defense period, and accelerated during the war by industrial expansion. Termination of the war found Philadelphia with a tremendous housing shortage, and most nonresidential construction was deferred to divert critical materials.

The principal public non-war improvements completed between 1937 and 1946 included a subway extension and two municipal airports. Southwest airport handled scheduled air line operations, whereas Northeast airport became a mixed operations field. Plans were in preparation in 1946 for expansion of airport facilities, including modern terminals at both municipal fields and increase in area to 2,525 acres and 1,800 acres, respectively. The largest undeveloped area within the city was in the northeast, where the greatest proportion of postwar residential construction was under way.

During the decade Philadelphia had four mayors. Mayor S. Davis Wilson, elected in 1936, died Aug. 19, 1939, and was succeeded by George Connell as acting mayor. Robert E. Lamberton, elected in 1940, died Aug. 22, 1941. Bernard Samuel served as acting mayor until 1944, when he was elected for a four-year term.

The city's financial position improved greatly during the decade. Although the assessed valuation of real and personal property, of which the city's borrowing capacity remained a fixed percentage, declined from \$3,618,000,000 in 1936 to \$3,065,000,000 in 1945, payment of maturing bond issues carrying 4% to 5% interest, cessation of borrowing and refunding of loans at substantial savings in interest, gradually improved the situation. Another contributing factor was a tax on earned income, imposed in 1940 and amounting in 1945 to 25% of revenues. In 1945, for the first time in many years, the city had a free borrowing capacity of about \$18,000,000, and loans totalling \$17,000,000 were authorized, including \$8,000,000 for sewerage work. Additional borrowing capacity was obtained by imposing charges for sewer service, making the sewerage and sewage treatment works self-sustaining and the debt deductible in computing the debt chargeable against the legal debt limit. Since existing as well as proposed new sewer debt was deductible, general borrowing power of \$47,000,000 was acquired, and \$34,000,000 more could be borrowed specifically for sewerage work. An increase in the valuation of taxable property in 1946 advanced the city's general debt limit to \$317,000,000 against which debt totalling \$248,000,000 was chargeable, leaving a margin of \$69,000,000 for borrowing. Further loans totalling \$45,000,000 were authorized. These, with loans previously authorized and \$11,000,000 remaining from a waterworks loan, also deductible, enabled the city to finance a program of public improvements costing \$107,000,000, and have about \$24,000,000 of borrowing power left over.

A popular movement culminated in 1943 in organization of a new City Planning commission. Its staff analyzed population, economic and social trends to determine the character and extent of the city and region's development, and the need for public improvements, housing, transportation facilities, port development, recreational facilities and other features. Long-range plans were developed for future patterns of land use, housing, transportation and other aspects of the city and region's development, as well as for year-by-year needed public improvements. The latter were recommended annually for six years in advance after study of projects submitted by city departments and other official agencies, consideration being given to relation of each project to others, to need and to financial ability of the city, as well as to relation to long-range plans. Projects recommended for 1947-1952 included facilities for completely treating sewage and thereby eliminating pollution of the Delaware and Schuylkill rivers, several express highways, airport extensions, port improvements, a program of recreational facilities development and land purchase, major changes in the water supply including improved treatment and many other improvements. During World War II, large sums were made available for preparation of plans for projects to be carried out later.

Redevelopment and rehabilitation of blighted areas received impetus from the Redevelopment authority, created in 1945 and empowered to assemble land, using eminent domain where necessary, and to hold or dispose of the land in accordance with redevelopment plans approved by the Planning commission and carried out by

either public or private organizations.

(B. SA.)

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Philately

The decade 1937-46 marked philately's "coming of age," so to speak, for during that period stamps for prepayment of postage and the collecting of such completed their first century. It was on May 1, 1840, that adhesive stamps were first sold, and five days later they were first used. Great Britain was the country that made the experiment. During the next few years, the idea spread to other countries.

The proposed Centenary exhibition was to have been held in London in 1940 but was cancelled permanently by World War II. Extensive plans were laid during 1946, however, for an exhibition in New York city of global character to celebrate in 1947 the centennial of the first U.S. issue on July 1, 1847.

Quantities of stamps, especially the irreplaceable classics, were destroyed during World War II. A surprising amount was saved, however, through the essential value and ease of transportation of the material. How much the outstanding rise in values—probably the greatest development in philately during the decade—owed to this loss could not be properly evaluated at the end of the period.

Another factor in the price increase was the great influx of new collectors, especially in those countries untouched by the physical ravages of war. It was noted in South Africa, in Latin America and, above all, in the United States. High income, limited consumer goods and the value of a hobby as a relaxation in tense times all contributed to this development.

"Stamps for the Wounded."—In the U.S., the interest displayed by soldiers in stamp collecting moved a number of interested philatelists to undertake visits to wounded soldiers in hospitals, with gifts of stamps and accessories. As the demand for such services grew, a movement was started in isolated areas to gather duplicate stamps and materials for such purposes. Charles Hahn, then editor of *Weekly Philatelic Gossip*, proposed that the two main societies of collectors in the United States, the American Philatelic society and the Society of Philatelic Americans, combine their efforts with those of these regional groups. In 1944, this was done, and "Stamps for the Wounded"—through the efforts of countless unheralded volunteers—visited the wards of all hospitals in the U.S. and supplied those interested with materials for collecting stamps.

Stamp Values.—Although there was no accepted stamp rule of value for comparing price trends, the normal market-research methods were as applicable to philatelic prices as to any other market. Furthermore, there was a measure of values in the various catalogues issued in the various countries.

Based on a sample of U.S. stamps, including none of the rarities and the preferred form (mint or used) of the issue considered, a comparison of values in the 1937 and 1946 issues of the *Scott's Standard Catalogue* showed that the values of the latter year averaged 175% of those of ten years previous. This analysis did not include airmail stamps, which will be considered separately. A similar comparison of the stamps of Great Britain showed a 1946 average value increase of 145%. In the British empire, average value increased 215%; in Latin America, 92.5%; in Europe (excepting Germany and Italy), 125%; in Italy, 94.5%.

These figures were not conclusive, however, for there had been a marked change in cataloguing practice—the

prices of 1946 were nearer the actual market price than those of 1937, when catalogues were just emerging from the "50% discount" mania (dealers selling at 50% discount from catalogue prices). Nevertheless, it was generally recognized that prices in 1946 were from one and one-half to two and one-half times those prevailing (on the same items) in 1937.

During the same period, a representative sample of airmail stamps showed a value increase of 138%. This was not true of all stamps, of course, nor of all countries. Because airmail stamps came into being mostly during the period when the trend to net prices was in vogue, the "discount" practice did not affect their value as it affected the value of nonairmail stamps. During 1946, prices on airmail stamps—with notable exceptions, of course—were close to one and one-half times 1937 prices. The notable exceptions were those which sky-rocketed in price and those which plummeted down.

Cataloguing.—Stamp catalogues are the bases of exchange and sale of stamps. In Great Britain and much of the empire, the catalogue most used is *Gibbons*. In France, it is that of *Yvert y Tellier*. Other geographical groups have their preferences, but by far the most used in the United States and Canada, as well as in many other countries, is *Scott's Standard Catalogue*.

When, in 1938, the publisher of *Scott's Standard Catalogue* became disassociated from dealing in stamps and became a publishing house, though retaining a nominal connection with the stamp-marketing organization, it was thought that Scott's—the oldest of all current catalogues—had reached a new niche in its field. During 1939–45, the unusual demand, heightened by the lack of imported catalogues, promised a new high in publication numbers; but paper rationing held it down to normal figures. In 1946, the catalogue was sold again—this time to a stamp auctioneer, who had previously served as an assistant to the editors in pricing the previous editions.

The 1946 catalogues, almost without exception, contained an increased number of listings over those in the 1937 issues. Scott's, e.g., was in two vols. containing about 750 and 1,000 pages respectively in 1946, whereas in 1937 the publication was in one vol. of less than 1,200 pages. Similar comparisons might be made of *Gibbons'* and of *Yvert's*.

War Issues.—World War II produced a number of peculiar issues. Chief among these were the occupation issues of axis countries. Laws of practically all warring nations forbade importing, even through neutrals, the stamps of enemy nations. Late in 1945, the *Scott Catalogue of Axis Issues* was distributed. This listed stamps known or believed to have been issued officially in the axis nations and in occupied countries (see accompanying table).

The stamps of Poland and Norway issued under German dominion should not be confused with other issues of the same period that were put out for the respective governments-in-exile for use on national warships and ships under the national flag with sea post offices on them. These were recognized as legitimate by the Universal Postal union.

When, in 1944, the Crown Colony of Falkland Islands issued seemingly unnecessary stamps for Graham Land, South Georgia, South Orkneys and South Shetlands—all dependencies of the Falklands—it was not with the view of selling stamps to collectors so much as it was an assertion of its claims to these almost uninhabited coaling and radio stations.

Philatelically speaking, there were also some retaliatory occupation issues. Each occupation zone of Germany issued stamps. During the actual fighting, while liberated terri-

Stamps Issued in Axis and Occupied Nations							Special
	Postage	Semi-p.	Souvenir	Air	Due		
Albania	26	8			3		1
Andorra (French)	2				12		
Belgium	4	71	5				3 official 6 parcel post 8 official 3 tax 16 official 7 tax
Bulgaria	42						12 official 9 newspaper 7 newspaper 3 parcel post 7 military
Corfu	20			12	11		
Croatia	81	66	12		19		
Bohemia and Moravia	31	20					
Slovakia	52	23			25		
Denmark							
Finland	27	16		1			
France	22	50			10		
Germany	8	91		3			16 various 12 military
Greece	18	10		18	5		
Hungary	48	39			16		
Ionian Islands	31			9	4		
Italy	20	4					20 military 3 spec. del.
Italy (Northern)	34				13		
Karelia	12	1					
Montenegro	47	8		28			
Netherlands	18	13	2				
Norway	25	16		1			21 official 7 official 12 official
Philippines	39	6	2		1		
Poland	25	30					
Romania	52	85	9				
U.S.S.R.	40						
San Marino	49	2		21	1		2 spec. del.
Serbia	46	33	4	20	22		
Yugoslavia	70	4		17	22		2 spec. del.

tory was under Allied Military government, there were special A.M.G. issues, prepared in advance and usually printed in Washington, D.C., which served as the local accredited postage. As rapidly as possible in liberated zones, the normal civil functions, including postal arrangements, were returned to the responsible governments.

The Philippines, receiving full independence on schedule despite the Japanese invasion and occupation, heralded the day of independence (July 4, 1946) with a new issue proclaiming its status as an independent country.

One of the perquisites of sovereignty is the coining of moneys and the issuing of stamps. Reference *supra* to the Polish and Norwegian issues in exile gives this point, as it was a deliberate move to remind all nations of the existence of a legal government, even though exiled from native soil. The Universal Postal union, by accepting these stamps, made tacit acknowledgment to the world that these governments were the accredited *de jure* nations.

Propaganda Issues.—During World War II, many governments made use of postage stamps for advertising and propaganda. When the United States began to rearm (1941) before hostilities commenced, a series of three common values, one cent, two cent and three cent, stressed national defense. After the declarations of war, a three-cent value emphasized the slogan Win the War! (1942). China's long resistance to Japanese aggression was heralded with a stamp issue of the United States (1943). During that same year there were issues for the United Nations and the Four Freedoms and, finally, a series of stamps commemorating the overrun nations of the world. These stamps were of a five-cent value and each depicted the flag, in colours, of the nation honoured. Twelve of these (for Poland, Czechoslovakia, Norway, Luxembourg, the Netherlands, Belgium, France, Greece, Yugoslavia, Albania, Austria and Denmark) appeared in 1944 and one (Korea) in 1945.

Canada issued a series showing war production (1942–43); New Zealand, despite preoccupation with the war, commemorated the centenary of its settling (1940); Brazil called attention to its army in Europe (1945); Cuba and Costa Rica issued V for Victory stamps (1943); Australia commemorated its fighting forces (1940) as did many other nations.

There were, however, other uses of stamps for propaganda. Allowing them to leak out through Sweden, the Germans planted a series of Liquidation of the Empire

stamps for Great Britain. These were "issued" soon after D-day (June 6, 1944) and were forgeries of the current British stamps with the cross on the British crown replaced by the Star of David, and the d. (denoting pence) replaced by the hammer and sickle device. The various values were overprinted "Liquidation of the Empire" with the name of one of the colonies in which a base had been granted the United States or which had fallen to the Japanese. Other stamps let out included a parody of the Silver Jubilee stamps of 1935 with the head of Stalin replacing George V, and one of the coronation issue of 1937 with Stalin in place of Queen Elizabeth.

During 1946, it became known that the Allies forged stamps to be used by secret agents in Germany, to avoid the danger of going to post offices to buy postage for propaganda mailed in that country. This was a repetition of a practice started in 1915-17, during World War I.

Far more interesting, however, were several stamps ascribed to the Psychological Warfare services. During 1941, Italy had issued a series of stamps showing Hitler to the left facing Mussolini to the right and a legend *Due Popoli; Una Guerra* (two peoples, one war). The propaganda stamp, which reached Italy just before the collapse there, showed Hitler snarling, Mussolini cowering. The legend read: *Due Popoli; Un Fuehrer—Two Peoples; One Leader!*

Another, far more deadly, satire was the Himmler stamp of 1944, which replaced the head of Hitler with that of Himmler just at a time when the former was growing suspicious of the latter. Mailed, in Germany, to people who lost no time in showing it to the jittery leader, it was credited with helping undermine Himmler at a psychological moment.

Still another use of parody propaganda was the mailing of a flood of material in Germany with stamps that merely emphasized certain lines in the usual Hitler head so that it appeared, at first glance, to be a skeleton.

Literature.—At the Eleventh American Philatelic congress (1945), George E. Turner presented data to show that in the United States only 3.3% of the more than 2,400 stamp journals he had recorded had published more than 100 issues, and that only 37.5% of these were still extant.

Undeterred by this record of mortality, stamp journals continued to spring up in every country as paper became slightly easier to secure. The *London Philatelist*, completing its 55th year in 1946, was still on a reduced scale. On July 1, 1944, it dropped from monthly to bimonthly, partially because of lack of text (many philatelists having more urgent work than stamps in the war years) and partially because of paper shortages and the bombing of a printing plant.

None of the older journals of the United States changed status during the decade 1937-46, but in the latter part of 1946 a new weekly magazine, *Philately*, made its appearance. This brought to five the major weeklies published in the United States.

Two general books for general stamp collectors appeared in 1940. In England, L. N. and M. Williams wrote *Philately—an Outline of Its Elements*, while in the United States, *So You're Collecting Stamps!* by Mammel Hahn appeared. A revised edition of the latter also appeared in 1946. Stanley Ashbrook's monumental study of the *United States One-Cent Stamp of 1851-57* appeared in 1938. This two-volume set was extremely well illustrated and was awarded the Crawford medal of the Royal Philatelic Society of London. Another specialist study, *Les Emissions du Type Léopold*

II, 1883-93 by Paul de Smeth also was published in Brussels in 1938.

Outstanding Stamps.—In addition to the stamp issues previously mentioned, the decade 1937-46 produced many others worthy of remembrance.

In the United States, the year 1937 saw a set of five stamps for the army and a similar set for the navy. Each of the lower values showed two or three commanders of the armed forces and a view of a battle or a ship or fort. The highest value (five cents) of each set showed the service school—West Point for the army, Annapolis for the navy.

A complete new general issue appeared in 1938, from the one-half cent through the \$5 value. It was known as the presidential series, since each of the integral values portrayed a former president of the United States, in chronologic order. Living presidents were, by law, not so honoured. The one-half cent values showed: one-half cent, Benjamin Franklin, first colonial postmaster; one and one-half cent, Martha Washington; four and one-half cent, the White House.

In 1940, the United States issued several parallel sets of five stamps each, honouring native authors, poets, educators, scientists, composers, artists and inventors.

All the components of the British empire joined in two issues: the coronation of George VI in 1937 and a victory issue in 1946. Great Britain, breaking a rule of 100 years, issued a commemorative in 1940 on the occasion of the centenary of postage stamps. Several other countries also issued commemoratives for the centenary, among them Brazil, the Dominican Republic, Cuba, Paraguay, Portugal and El Salvador. In 1843, Brazil commemorated the centenary of its own first stamps, and Cuba likewise commemorated these as the first stamps issued in America. Also in 1943, Switzerland commemorated its own first centenary of Swiss stamps.

The 40th anniversary of the discovery of radium, for some reason, was commemorated not only by France but also by some other countries with stamp issues—among these Cuba and Afghanistan.

Not only did the United States commemorate the sesquicentennial of the ratification of the constitution in 1938, but many other governments did likewise. Guatemala issued a special sheet of four stamps, one of which portrayed Washington, another F. D. Roosevelt. The latter also appeared on a Brazilian stamp with Brazil's Pres. Vargas in 1940. Other nations issuing stamps for the U.S. constitution anniversary were Brazil, Panamá, Ecuador, the Dominican Republic, China, Turkey and El Salvador.

During 1939, the two world's fairs held in the United States—at New York city and at San Francisco—were saluted by a three-cent stamp in the United States. Other countries also commemorated one or both with longer series: Brazil, France and French colonies, the Dominican Republic, Iceland, Paraguay, the Portuguese colonies, Mexico, Rumania, U.S.S.R., the Netherlands, Poland and Czechoslovakia were among those saluting New York; El Salvador signalized the San Francisco fair; while Ecuador and Nicaragua issued series for both New York and San Francisco.

The 50th anniversary of the founding of the Pan American union fell in 1940. Despite the war raging in much of the world, many nations of the union issued one or more commemorative stamps, including the United States, Cuba, Honduras, Guatemala, Ecuador, the Dominican Republic and El Salvador.

Other Developments.—The efforts of philatelists for more than 50 years were crowned with success when con-

gress specifically permitted the illustration of all stamps, including those of the United States, in 1938. Limiting the illustration to black-and-white, the bill permitted illustration of United States stamps in three-quarters dimension or smaller or one and one-half times as large or larger.

The *Standard Catalogue*, after holding out for some time, finally admitted War and Defense Savings stamps of the United States to its listings. This action necessitated going back to World War I and including the Thrift stamps and War Savings stamps of 1917-18 and the succeeding few years.

The philatelic agency of the U.S. post office dept., offering stamps particularly for collectors, was augmented in 1942 by a revenue agency, purveying current stamps in collectible condition especially for collectors. The Philippine government continued its philatelic agency in Washington, D.C., and although constituted as an independent republic in 1946, continued to sell stamps to collectors. The Pan American union, with headquarters at Washington, D.C., maintained an agency selling stamps of the Latin American republics.

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Philippines, Republic of the

The ten years between 1937 and 1946 were for the Philippines the great years of transition, crisis and realization. It was difficult to cite an analogous compression of events from the history of any other country.

Road to Freedom.—At the beginning of the decade, the Philippines had just become a commonwealth, a status provided under the terms of the Tydings-McDuffie act of the United States congress. By this act, signed by Pres. Franklin D. Roosevelt on March 24, 1934, a ten-year period of politico-economic transition was provided, to culminate on July 4, 1946 in a proclamation of independence, to be issued by the president of the United States.

On Nov. 15, 1935, Manuel L. Quezon, for so many years the leader of Philippine independence struggles, had taken his oath as first president of the Philippine commonwealth. He had been duly elected, along with Vice-President Sergio Osmeña, by democratic process, just as the constitution, duly drafted by popular convention, had been approved by popular plebiscite.

That constitution was modelled after the U.S. constitution, with some modifications. Amendments to the constitution could be adopted by submission to a national popular vote, but could only be proposed by a vote of three-fourths of both houses of the Philippine congress; a similar congressional vote could convene a constitutional convention to consider amendments which, in turn, had to be submitted to popular referendum. The original constitution provided a unicameral legislature and a single six-year term for the chief executive. Philippine experience with a unicameral legislature had been unsatisfactory; the constitution was amended in 1940 to provide for a bicameral legislature with the members of the senate to be elected at large for six-year terms. As in the United States,

one-third of the senators were to be elected every two years. The term of the chief executive was shortened to four years but he was made eligible for a single re-election. A chief executive could not succeed himself more than once, reflecting the desire to prevent, by all means, perpetuation of personal leadership.

Under the Philippine constitution, the chief executive was given sweeping executive powers and ample authority to manage and control the executive and administrative branch of the government, subject to the fiscal controls of congress. He could veto separate items of an appropriation bill, for example. The constitution, itself, provided that in national emergencies, congress might give the president comprehensive emergency authority, subject to congressional review. The president was likewise given an explicit mandate to promote social justice among the people. There were explicit and comprehensive safeguards of individual rights and liberties. The Bill of Rights, inserted as a basic portion of the Philippine constitution, was perhaps the most embracing and pervasive document of its kind. In the U.S. tradition and in the tradition of western liberty, the rights of the individual were safeguarded against all forms of government encroachment, but at the same time the central government was given full authority, subject to periodic review by the people, to deal vigorously with the social problems of the day.

A ten-year period of economic transition was envisioned under the terms of the Independence act. It was to be a period of preparation for independence itself. Virtually all powers over domestic affairs, except over currency, immigration, internal indebtedness and a few other matters, were vested in the commonwealth government. The sole U.S. official left in the Philippines was a high commissioner who had advisory and informational powers with respect to domestic matters, and represented the president of the United States in matters affecting foreign relations. Otherwise the government structure was in Philippine hands.

Staggering Economic Problem.—Thus the country started out on the road of transition to national freedom. It faced basic economic problems; the economy was tied to the U.S. free market; most of the chief export products—sugar, coconut oil, cigars, tobacco and cordage—depended upon U.S. tariff preferences, in order to be, on July 4, 1946, capable of unqualified economic independence. As a forcible "inducement" to adjust the economy, an export duty amounting to 5% of the U.S. tariff was to be applied, beginning in 1941, to exports to the United States, to increase by 5% annually until 1946. This export tax was to be applied to all Philippine products of a dutiable nature. The collections were to be earmarked by the Philippine government for the retirement of the government's bonded indebtedness. The Philippine government, moreover, was to be refunded the processing taxes collected in the United States on coconut oil and on sugar, thus providing a source of money for economic adjustment purposes.

The task of economic adjustment was tremendous. To revise the nation's entire economy in ten years was a problem to give pause to the most courageous. One-third of the government's ordinary revenues came from the sugar industry, an industry dependent entirely upon the U.S. market. One-half the national income depended upon exports to the United States, most of which were dutiable. The job facing the Philippines was to broaden and diversify the economy and to establish the machinery for transferring the nation's productive energies into fields independent of



Tragic remnant of the Bataan "death march," carrying their more exhausted comrades in makeshift litters as they neared Camp O'Donnell, Japanese internment camp on Luzon. Lt. Gen. Masaharu Homma, who ordered the march, was executed as a war criminal on April 3, 1946

U.S. tariff preferences. It was such a tremendous task that some Philippine leaders considered that the Independence act passed by the U.S. congress had ironic and ungenerous aspects, aspects which were ascribed to isolated selfish interests in the United States. But President Roosevelt, recognizing these aspects, gave public assurance after he signed the Independence act that "injustices and inequities would be remedied," if demonstrated in the operation of the act.

Because there were few available accumulations of free Filipino capital, the Philippine government was required to take the initiative in the vast economic adjustment program. A National Economic council was established. The National Development company, with great powers, together with a number of other government corporations, agencies and instrumentalities, were authorized and directed by the Philippine congress to deal with the problems on the broadest possible front. Among these agencies were the National Rice and Corn corporation, the National Tobacco corporation, the National Coconut corporation, the National Abaca and Other Fibres corporation, the National Land Settlement administration, the People's Homesite corporation, the National Power corporation, the Agricultural and Industrial bank and the National Food Products corporation. All of these were directed to institute such programs as would benefit producers and consumers, and help plan for the great transition. Money was made available in many cases from the refunds of the excise taxes collected in the United States. Some progress was made in instituting scientific methods in a few agricultural lines.

In order to carry out a large-scale program of developing industry and agriculture, it was necessary to "import" technical advisers, to send Filipinos to technical schools in the United States and elsewhere, to engage in a vast program of public education and to explore and establish new markets for the new products which were proposed to be developed.

There were many immediate questions crying for solu-

tion. Chief of these was the land problem. For centuries the main food-producing areas in the Philippines had been increasing in population, with the ownership of considerable areas concentrated in relatively few hands. Seasonal tenant farming, with all its incident evils, provided a never-ceasing source of social discontent. An obvious solution was a resettlement program. Between 1936 and 1940, numerous steps were taken, and some progress was made. Roads were built; new areas were opened up and water power sites were surveyed.

Despite all efforts, however, it was apparent that 1946 would find the economy grossly unprepared to meet the sharp impact which would result from being suddenly excluded, by reason of the tariff, from the United States market. The time was too short to make a complete transition.

In 1937, President Quezon reached an agreement with President Roosevelt for the establishment of a joint commission to study the problem. That commission became the Joint Preparatory Committee on Philippine Affairs, with six U.S. and six Filipino members, presided over by John V. MacMurray, former U.S. minister to Turkey. The committee held hearings in the Philippines and in the United States and conducted studies over a period of almost two years. Its report, presented in 1939, called for a 15-year period of postindependence adjustment running up to 1961, a period during which tariffs on Philippine goods would increase by 5% annually until they reached a total of 100%. For certain commodities, such as coconut oil, cigars, tobacco and embroidery—commodities which were not believed to be capable of withstanding the imposition of any tariff duty—declining duty-free quotas were recommended instead of progressive tariffs. That proposed program was submitted to the chief executives of both countries for their consideration.

On the basis of this report, legislation was submitted to the 76th congress of the United States. After many months of hearings and discussions, a bill, much amended, was signed and approved by President Roosevelt on Aug. 7, 1939. It consisted of a number of amendments to the original Independence act, substituting declining duty-free quotas for increasing tariffs for coconut oil, cordage, cigars, tobacco, embroideries, pearl buttons, but terminating effectiveness on July 4, 1946. Instead of extending tariff preferences beyond July 4, 1946, the United States congress deferred this issue by providing that not later than two years before independence, an economic committee would be set up, including three members of the U.S. house and three members of the U.S. senate, and a like number of appointees by the president of the Philippines, to study the postindependence economic relations between the two countries. Although it was growing late, no decision was yet made.

Economic and Social Democracy.—The progress in economic adjustment has already been discussed. The steps taken were not alone to provide a national economy independent of the United States; the measures were set in a framework of free, progressive democracy whose objective was social and economic justice for all. Numerous measures enacted during the first years of the commonwealth were directed toward this end. One of them was an eight-hour labour law. A national benefit insurance system for all government employees was created. Government charity clinics and child-care centres were established in practically every town throughout the nation. Minimum-wage levels were established for labourers in both government and private enterprise. Comprehensive workmen's compensation legislation was enacted.

The government laid down a program of adult educa-

tion schools, not only in the centres of population but also in the distant barrios. Community assemblies for the dissemination of news and information were encouraged in villages which could not be reached by newspapers. Primary schools were established in the remotest areas. The services of social welfare agencies were made available to the poorer classes. Provincial hospitals and public dispensaries were set up throughout the land.

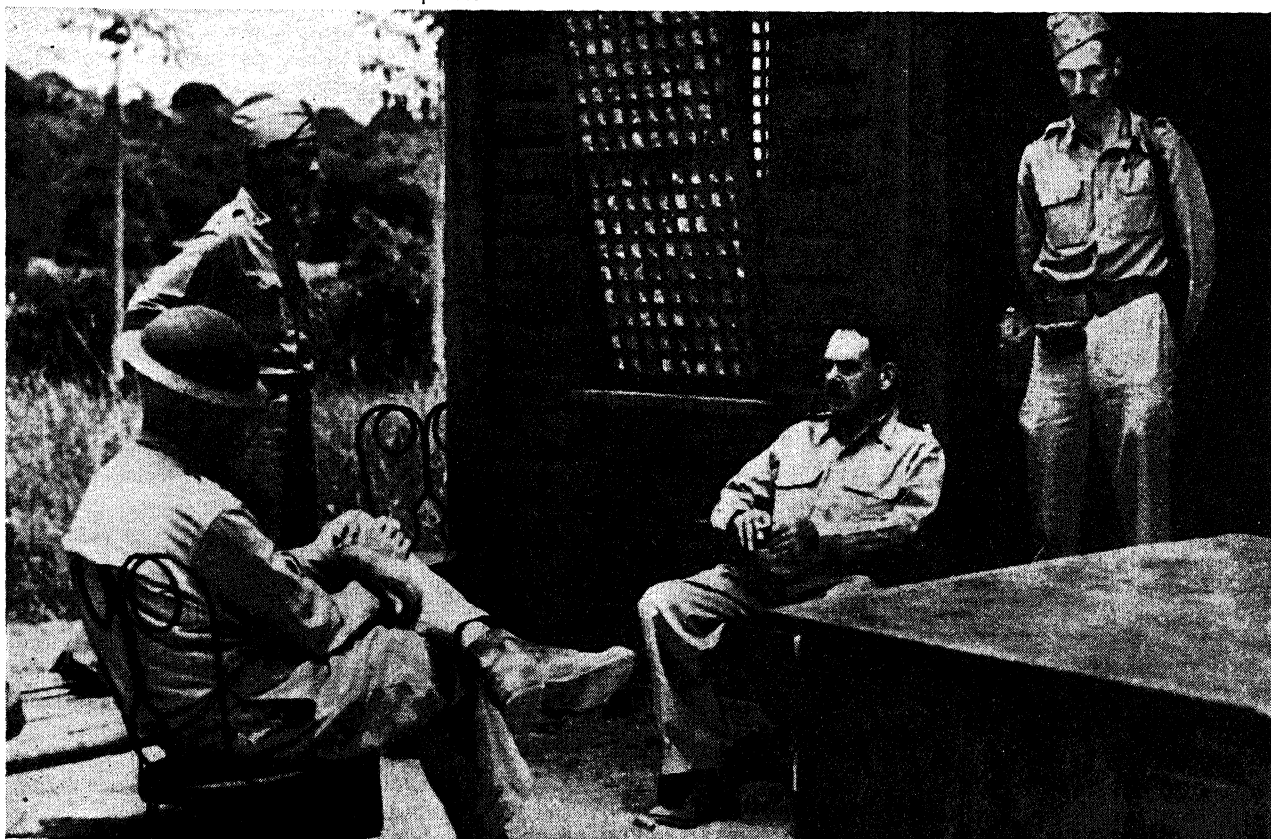
To meet the urgent problem of farm tenancy and landlessness, the government initiated plans—plans which were interrupted by World War II—to acquire large landed estates in Luzon. The aim was to subdivide these estates into small lots for distribution to tenants and occupants. Many of these estates belonged to the Catholic Church, whose officials in many cases proved willing to co-operate with the government program.

Ambitious farm projects were also launched. The National Land Settlement administration established farm colonies in Koronadal Valley in Mindanao and in Malig settlement in Isabela. Plans were laid to initiate a number of such projects; credit facilities and other aids were provided. Vast areas of the rich and fertile island of Mindanao, areas already part of the national domain, were set aside for development in this manner.

In the slum districts of Manila, the National Homesite corporation built tenement houses to be rented to workers at low cost. A model workers' settlement was laid out by the government in Baguio where houses were built for labourers and other low-salaried employees.

In order to insure protection of the interests of the workers, a court of industrial relations was created to decide labour and industrial disputes. Provision was made for compulsory arbitration of strikes and lock-outs. Because the Philippines had a largely agricultural economy,

Maj. Gen. Edward P. King, Jr., last U.S. commander on Bataan in 1942, as he waited with his aide at Lamoo in April to discuss terms of surrender with the Japanese



labour was not organized to any considerable extent, but legal protection was given to such labour unions as existed.

The tax structure was codified and revitalized. Increased taxes on luxuries, amusements, mine profits, gifts, inheritances and income were imposed. The principle of taxation on the basis of ability to pay was firmly implanted in the new tax system.

Some social measures have already been described. There was a concerted effort, led by the administration, to establish social equality, especially equality of opportunity for the young. Government scholarships and special educational aids in vocational, agricultural and professional fields were made available. The entire government program was designed to impress upon the people the fact that the government desired and intended to make progress toward full social justice, although such progress had to be measured in terms of available resources and finances.

Political and Judicial Democracy.—On the political front, democratic practices were encouraged and promoted. Although the administration party, the Nacionalista party, had an overwhelming majority, and although the fight for independence had tended to encourage political unity, every protection was given to minority groups, who were represented in the legislature, in the City council of Manila and by mayors in various outlying cities. Just prior to the 1935 national election, a deep split in the Nacionalista party, which occurred because of conflicting views over independence legislation in the United States, had been healed. Sergio Osmeña, leader of the opposition to Quezon, was nominated and elected Vice-President. This was later to allow Osmeña, a venerated political leader in the Philippines, to become president upon Quezon's death in 1944.

An independent judiciary of unimpeachable integrity had been one of the fundamental innovations of U.S. rule. Under the commonwealth, the role of the judiciary was further emphasized and exalted. The supreme court, with jurisdiction and status very similar to those of the United States supreme court, was further enhanced in prestige and authority. Its personnel was carefully selected from the most eminent of the nation's jurists and personages. An innovation during the commonwealth period was the establishment of a court of appeals, along U.S. lines, to share the burden of appellate jurisdiction with the supreme court, whose superior jurisdiction, however, was unquestioned. Another innovation was the creation of the Office of Public Defender, composed of lawyers whose function was to defend, without charge, the rights of labourers and small farmers in court litigation.

Question of National Defense.—Although the United States had primary responsibility for the defense of the Philippines during the commonwealth period, President Quezon, recognizing that in 1946 the responsibility would be suddenly shifted to the new Philippine republic, made as his first recommendation to the first session of the commonwealth legislature in 1936, a proposal for the establishment of an office of national defense. General Douglas MacArthur, who had just completed a term of office as chief of staff of the United States army and who had been commander of the Philippine department of the United States army, was engaged as military adviser and head of the United States Military mission to the Philippines.

General MacArthur served in that capacity for five years, leaving it in the summer of 1941 to become commanding



One of the floats in a parade held in Manila during the visit of Premier Hideki Tojo to the Philippines in 1943. Pictures of these events, obtained through neutral sources, were the first photographs from the Philippines to reach the United States after the Japanese occupation in 1942

general of the United States army forces in the far east. It was in that post that General MacArthur was destined to carve for himself an immortal niche in the military history of the far east.

The first move to implement the Philippine national defense was the creation of a citizens' army through a constitutionally-sanctioned system of universal military training. An annual appropriation of 16,000,000 pesos was approved to support and maintain a regular army of 930 officers and 10,000 men and a reserve force of not less than 400,000 men, the latter total to be reached by 1946. A 250-plane air corps and a small naval patrol to consist of 100 fast torpedo boats, were projected.

Under the training program, approximately 20,000 youths were given basic military training annually, serving for a period of five and a half months. Because of shortages of equipment, the training necessarily was rudimentary; but as inadequate as it was, that training was to bear rich fruits in years soon to come.

World War II.—Although Japan had been in the process of aggrandizing its territory and economic authority in the far east for a number of years, there was little fear of imminent danger to the Philippines until after the outbreak of war in Europe in 1939. With the downfall of France and the commitment made by the United States to the victory of the Allies in 1940, there were increasing apprehensions in the Philippines that a conflict in Asia was inevitable. It had long been contemplated that Philippine security could be provided by neutralization, a guarantee of Philippine integrity by all the Asiatic powers. Such a neutralization proposal had been written into the Philippine Independence act, calling upon the United States to initiate the neutralization move.

Japan, however, was continuing unchecked in its expansionist ways. The war party took unabashed leadership of the Japanese government. In the Philippines, apprehensions turned to convictions. Faith in neutralization was dissipated.

In the early hours of Dec. 8, 1941 (Manila time), the radio carried word that Pearl Harbor had been bombed. Philippine officialdom was galvanized into action. The Philippine army had already been mustered on July 20, 1941, into the service of the United States armed forces. The withdrawal of U.S. marines from China in the late fall of 1941 made the Philippines the farthest Pacific outpost of U.S. military power. The U.S.-Philippine forces consisted of approximately 100,000 ill-equipped Filipino reserves, 5,000 Filipino regulars with little combat experience, 12,000 Filipino scouts, who were part of the United States army, approximately 10,000 U.S. army troops, including many reserves, a small air force and two regiments of marines. With this hastily improvised "army," General MacArthur undertook the defense of the Philippines. The U.S. naval forces in the vicinity consisted of the so-called Asiatic fleet: a converted cruiser-flagship, a sea-plane tender, several ancient cruisers and a number of destroyers, none of which was fitted out with modern anti-aircraft equipment, anti-aircraft fire control, radar or the other essentials of modern naval warfare. A squadron of ancient sea-plane bombers and a few new motor torpedo boats completed the force.

The Japanese struck by air in the early afternoon of Dec. 8. They landed in the Philippines on Dec. 9. The Filipino people, as a whole, responded with a single will, to resist, to fight off the invader and to drive him into the sea. General MacArthur did not even ask for the declaration of martial law. It was deemed unnecessary. But the defenders were outmatched. It was estimated that 200,000 crack Japanese troops participated in the initial landing. Quickly overrunning the beaches of Aparri and Lingayen, and in southern Luzon at Batangas, the Japanese swept down upon Manila, which was declared an open city on Dec. 24. What remained of the U.S. and Filipino forces withdrew into Bataan peninsula in accordance with preconceived plans. There General MacArthur waged the historic campaign associated with his name. Meanwhile, the naval forces, after inflicting maximum damage upon the Japanese, withdrew to bases in the East Indies, where most of the ships of that gallant little squadron went to their death.

On Feb. 20, a month and a half before the fall of Bataan, President Quezon, Vice-President Osmeña, U.S. High Commissioner Francis B. Sayre and a few members of their staffs were evacuated by submarine from Corregidor, President Quezon to the relative safety of the southern islands and High Commissioner Sayre to Honolulu. On March 11, General Douglas MacArthur was withdrawn to Australia on orders of President Roosevelt, to continue his gallant fight.

On April 9, 1942, the U.S.-Philippine forces on Bataan surrendered. On May 6, 1942, the remaining forces on Corregidor (*q.v.*) under Lt. Gen. Jonathan M. Wainwright, surrendered. (See WORLD WAR II.)

Simultaneously with his surrender, the U.S. and Filipino forces stationed in other islands of the Philippines were directed by General Wainwright to surrender as a condition precedent to the acceptance by the Japanese of the surrender of Corregidor. Some of the forces, notably in Mindanao, held out for a time. Many U.S. and Filipino soldiers as individuals and in some cases en masse fled to the hills rather than surrender. The bulk of Filipino

troops were concentrated in stockades; the U.S. troops in separate stockades. The Japanese began at once a policy which they figured would woo the Filipinos from their allegiance to the United States and to western democracy.

On leaving the Philippines, President Quezon had left his executive secretary, Jorge B. Vargas, in charge of civil affairs. Upon the occupation of Manila, the Japanese set up an Executive Commission under Vargas' chairmanship to take over civil administration. The Japanese had a single program in mind, namely, to obtain from the Filipinos the maximum amount of assistance for the Japanese war effort, and to include the Philippines in the so-called "Greater East Asia Co-Prosperity Sphere." A policy of pacification was to be carried out, permitting the stationing of a minimum number of Japanese combat troops in the islands.

In all of these objectives, the Japanese met from the beginning intense opposition. Japanese efforts to enlist the Filipinos on the Japanese side under the banner of coloured races *versus* white failed completely. From passive resistance, the Filipinos proceeded to active resistance. Isolated guerrilla bands became guerrilla armies. The more the Japanese looted, stole, oppressed, punished and tyrannized, the more the Filipino people resisted, rebelled and fought against their masters. Not a single island in the Philippines was without its resistance movement. By the middle of 1944, guerrilla forces controlled more than 60% of the actual territory of the Philippines.

The Japanese did their best to "Japanize" the islands. Instruction in English was discouraged; teaching of the Japanese language was made compulsory. School enrolment dropped to a fraction of its prewar proportions. The attempt to eliminate English as a common language was doomed to failure; even the Japanese had no alternative but to speak English to the Filipinos. Textbooks were purged of all references to the U.S. and Britain, and of the words "freedom" and "democracy." Radio sets were "reconditioned" to prevent reception of short-wave broadcasts from abroad. Heavy penalties were meted out for the "crime" of listening to short-wave broadcasts from the U.S. An airtight censorship was placed upon newspapers and other publications. The only available information concerning the war was that disclosed by the Japanese high command through the Japanese news agencies. An ambitious over-all program to "rejuvenate" Philippine culture was initiated, with a corps of university professors imported from Japan.

Political parties were dissolved to give way to one party, the "Kalibapi." The entire economy was taken in hand by the Japanese military in an effort to convert it to Japanese military needs.

In Oct. 1943, an elaborate pageant was held in Manila; "independence" was granted to the Philippines. The constitution of the puppet republic, drafted by Filipino leaders under the watchful eyes of the Japanese, was still a far cry from the Japanese model. It maintained the tripartite division between the judiciary, legislative and executive functions and even persisted in many Anglo-Saxon and western political practices. The entire "independence" was, of course, a rude joke; the Japanese had no intention of permitting the Filipinos to be anything but puppets of the Japanese military. Formal relations between Japan and the new "government" were largely ceremonial, since the real power continued to be held by the Japanese military command.

The Japanese were anxiously insistent upon placing in



General Douglas MacArthur personally led the return to Leyte Island in the Philippines on Oct. 20, 1944

positions of responsible leadership in the puppet government individuals who could be depended upon to command the respect of the Filipino people. Great pressure was brought to bear upon those leaders who were unwilling to lend themselves to this cause. The pressure consisted of threats, of retribution and even of death and torture. But the Japanese failed completely in their principal purpose. Although they succeeded in ruining the Philippine economy, they did not succeed in gaining much from it for their own uses.

President Quezon, Vice-President Osmeña and selected members of the cabinet meanwhile had established a government-in-exile abroad.

A hazardous and exciting submarine and torpedo-boat race with the Japanese had gotten the presidential party out of Corregidor. From a rendezvous in one of the southern islands, a plane had taken them to Australia. After remaining at General MacArthur's headquarters for a brief period, it was decided that the Philippine government could best function in Washington. On May 8, 1942, President Quezon and his party arrived at San Francisco. A special train sent by President Roosevelt took them to Washington where they received a triumphant welcome at Union station by President Roosevelt himself.

The government was established and a war cabinet was formed. The special emergency powers which had been voted the president in 1940 now served to enable the government to function constitutionally without a legislature.

Through General MacArthur's headquarters, President Quezon maintained contact with the forces of resistance and presided in civil affairs over the increasing area of the Philippines under the control of the resistance groups. The printing of so-called guerrilla currency was authorized. Provincial treasurers and other officials in the "free areas" were appointed. A "shadow government" under the very noses of the frustrated Japanese, functioned for all practical purposes. These areas, of course, were largely in the southern and central islands where Japanese military control was peripheral.

In recognition of the heroic Filipino attitude, President Roosevelt arrived at a decision to invite the Philippine government-in-exile to become a member of the United Nations. The Philippine commonwealth became the 28th signatory of the United Nations charter. When the United Nations Relief and Rehabilitation administration was formed, the Philippines signed as an adherent. A Pacific War council, established to co-ordinate the struggle against Japan, extended membership to the Philippine commonwealth along with Britain, China, Canada, the Netherlands, France, Australia and New Zealand. The Philippines participated in all the international conferences which were held during this period.

In 1943, the United States congress passed a special resolution authorizing President Quezon to continue in office until a successor could be duly elected. Congress felt that Quezon's leadership in the war effort was essential; and that until constitutional processes of free election could be re-established, he should continue in office despite the prohibition against service for more than eight years.

MacArthur's Promised Return.—As U.S. naval forces under Adm. Chester Nimitz and the land and sea forces under General MacArthur moved inexorably against Japanese strongholds in the Pacific, hopes rose high. The promised day was in the offing. Submarine and air contact was established with the U.S. forces, and supplies, munitions, food and money began to pour into the Philippines.

On Aug. 1, 1944, the Japanese radio carried the report that President Manuel Quezon had died in the United States. The news came as a tragic shock to the Filipino people. At first there was disbelief, since the Japanese had announced Quezon's death early in 1942, attributing it to tortures by the Americans. Short-wave broadcast from San Francisco, however, confirmed the sorrowful news.

In Washington, Osmeña succeeded Quezon, and pledged himself to follow all his predecessor's policies.

When United States troops landed on the island of Leyte, 200 miles south of Manila, on Oct. 20, 1944, guerrilla troops were ready to help clear the way. Many areas were captured from the Japanese before the U.S. troops reached them. Guerrilla regiments were thrust en masse into the fighting U.S. armies.

The U.S. forces received 300,000 recruits overnight, most of them seasoned soldiers and veterans of three years of jungle combat.

Immediately following the first wave of troops at Leyte, President Osmeña, side by side with General MacArthur, waded through the surf to plant the flag of the Philippines on Philippine soil. Tacloban, provincial capital of Leyte, was established as the temporary capital of the Philippine commonwealth.

Four months later, on Feb. 27, 1945, the commonwealth government was installed in Malacañan palace, Manila. Shortly thereafter, the Philippines were declared "liberated" and the reins of government were transferred to the Filipino officials. The remaining combat areas were successively reduced. Everywhere the Japanese fled before the conquering Filipino-U.S. armies. Japanese occupation forces, estimated at 300,000, who had four years in which to entrench themselves, were overcome in a matter of months. But the desperate fighting and the unbelievable and vengeful sacking of huge areas by the Japanese had left the Philippines a pitiful shambles.

Ruins of War.—In every large city, in hundreds of smaller municipalities and even in barrios, most of the habitable dwellings were destroyed; schools had been sacked and gutted; bridges over the principal rivers and waterways blown up; telephone and telegraph lines disrupted, radio stations dismantled and all the government buildings, with but isolated exceptions, in ruins. Transportation between the several islands and within the islands was similarly paralyzed. All the interisland vessels were sunk or taken away by the Japanese. No commercial aircraft remained. Street cars and busses were destroyed or stolen. Railroads were bombed into uselessness and most of the rolling stock gone. Factories, mills and plants everywhere were demolished. Most of the precious work animals, the carabaos, were eaten or killed. Farm lands were left fallow and untended.

Physical war damage was estimated, in prewar values, at 1,000,000,000 pesos out of a total prewar assessed value for all the Philippines of 2,250,000,000 pesos. In addition to this total of physical damage and the economic damage already cited, there were thousands of wounded and disabled, hundreds of thousands of families uprooted and dispersed and hundreds of thousands of breadwinners killed, maimed or missing. This was what the country inherited from war. This was the problem faced by the just-returned government, newly installed in the homeland.

The job of reconstruction and rehabilitation, however, had to be, for the moment, subordinated to the use of the Philippines as an invasion base for the anticipated onslaught against Japan. At one time, there were nearly 1,000,000 troops stationed in the Philippines. The dislocation of the national economy increased; the carefully laid plans made in Washington for the rehabilitation of the country, of its finances and currency, went completely awry. With all shipping concentrated on bringing war supplies to the Philippines, with hundreds of thousands of U.S. troops receiving millions of dollars in pay in Philippine pesos, inflation soon became extravagantly accentuated. Currency, which had been astronomical in terms of Japanese occupation "mickey mouse" money (about 3,000,000,000 pesos, all of which was declared invalid upon

liberation) became astronomical in terms of good U.S. dollars and the dollar-based Philippine pesos. Rice, the basic commodity of the Philippines, stood at more than ten times its prewar value. Other prices rose to corresponding levels.

In addition, there was the monumental problem of dealing with those who had held civil posts under the Japanese, the so-called collaborationists, whose disposition agitated the people and deeply concerned the officials of the United States government.

Painful Reconstruction.—This multiplicity of problems was sufficient to stagger the imagination of ordinary men. But they were not all. The Philippines, in the fall of 1945, faced the early imminence of the political independence that was scheduled to come on July 4, 1946, just a few months away. Independence itself would bring tremendous economic and political problems and changes.

During the occupation, the office of the United States high commissioner, last held by Francis B. Sayre, had been left unfilled. In Aug. 1945, President Harry S. Truman appointed Sayre's predecessor, Paul V. McNutt, as high commissioner for a second time. Upon McNutt's recommendation, President Truman, on Oct. 25, 1945, issued a series of 14 executive orders, laying down the civil policies

Filipino guerrillas and U.S. rangers who raided Cabanatuan prison in a daring rescue of 513 prisoners of war on Jan. 30, 1945. Most of the prisoners were survivors of Corregidor and the infamous Bataan "death march"



to be followed and calling for a number of studies and investigations of problems arising from the liberation of the islands. In line with one of these orders, the United States congress served notice that a general election should be held in the Philippines not later than April 30, 1946. The Philippine congress voted to set the date at April 23 and to name at that time a new president, vice-president and new members of the house of representatives and two-thirds of the senate.

Next, the United States congress took up the long-delayed matter of postindependence trade relations with the Philippines. In recognition of the fact that the Filipino people had proved themselves a heroic ally in war, the United States congress enacted a series of measures which, in the opinion of congress, rewarded Filipino valour. The first such measure, enacted with the support of President Truman, was the Bell act, which provided for 28 years of preferential trade relations with the Philippines after independence—eight years of free trade and 20 years of gradually increasing tariff duties and declining duty-free quotas, the latter in the case of coconut oil, cigars, tobacco and cordage.

In order to induce U.S. capital to venture into the Philippines after independence to help repair the ravaged country, congress required the Philippines to guarantee non-discrimination against Americans in the development of natural resources and in the operation of public utilities. The U.S. congress also required that for the 28-year period, the Philippine peso should remain pegged to the U.S. dollar. The tariff arrangements were to be reciprocal, in that U.S. products were to be admitted into the Philippines on the same basis as Philippine products into the United States.

The Philippines were granted a 28-year preference of two cents per pound on the processing of coconut oil in the United States, and were assured of quotas of sugar, coconut oil and cordage in the U.S. market for the same period.

The United States congress enacted at the same time a companion rehabilitation measure, a War Damage act. This authorized the award of \$620,000,000 in war damages to the residents of the Philippines and to the Philippine

government: \$400,000,000 for payment to private individuals, with an established priority for small claims of \$500 or less; a public works program of \$120,000,000 for the rehabilitation of public buildings and facilities and \$100,000,000 worth of surplus property which was to be turned over to the Philippine government. In addition, a considerable training program for Filipinos in technical fields, such as aerology, meteorology, road building, harbour engineering and fishing was also provided.

Meanwhile the national election was held. President Osmeña, the incumbent, was the candidate of the conservative wing of the Nacionalista party. Manuel Roxas, then president of the senate, was the candidate of the opposition forces in the same party. This group, dissatisfied with the conservatism of the administration, formally organized the liberal wing of the Nacionalista party and nominated a full slate of candidates. The campaign was very sharp, and the lines were clearly drawn.

Between what came to be known as the Liberal party and the Nacionalista party, the chief issue was conservatism *versus* progressivism, with a number of ideological cross-currents. The Liberal party won a resounding victory, electing its candidate for president by 200,000 votes and a majority of the seats in the house of representatives and the senate (66 out of the 98 house seats, and 9 seats in the senate out of the 16 seats which were up for election). These results gave the Liberal party a working majority in Congress and possession of the national administrative machinery.

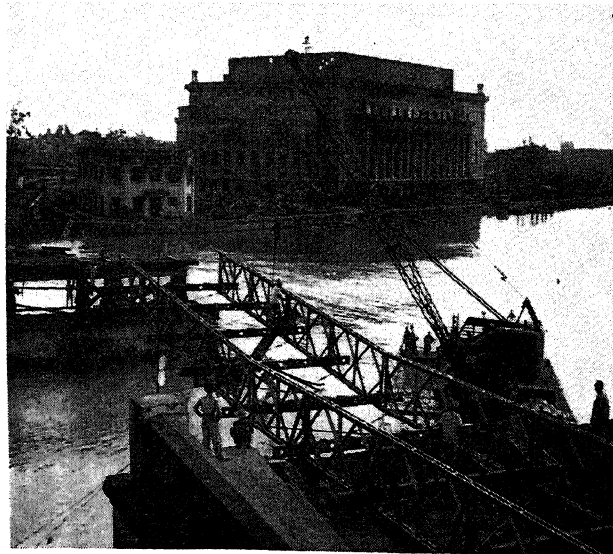
Roxas President.—The inauguration of the new president took place on May 28, three days after the new congress convened. In his first message to congress, President Roxas recommended a heavy program of legislative action, including (1) restoration of law and order through peaceful but firm measures; (2) an agrarian reform program, starting with the purchase of landed estate for distribution to tenants and an increase in the percentage of the crop to be distributed to tenants (70–30); (3) sweeping reorganization of the government machinery to eliminate waste, inefficiency and duplication; (4) a public works program; (5) a G.I. Bill of Rights for Filipino veterans and (6) establishment of credit facilities for economic rehabilitation. The president recommended, moreover, that the trade agreement with the United States be approved and that the Philippines maintain the closest possible relations with the United States.

Economic relations with the United States became a sharp and critical issue during these months. A section of the Manila press undertook a bitter campaign against the trade arrangements with the U.S., and against the United States generally. The Philippine congress, however, overwhelmingly voted to grant the President authority to sign the Executive Trade agreement.

On the morning of July 4, 1946, on the 170th anniversary of the birth of the U.S. nation, the Philippine commonwealth became the Republic of the Philippines. A historic ceremony was held on the Luneta, the plaza where the Filipino hero, José Rizal, met his death at the hands of a Spanish firing squad 50 years before. Representatives of 30 foreign governments looked on, as Paul V. McNutt, newly designated ambassador to the Philippine republic, read, on behalf of the president of the United States, the Proclamation of Philippine Independence.

To carry out the new nation's foreign policy, a department of foreign affairs was organized. Elpidio Quirino, Vice-President of the Philippines, was appointed secretary of foreign affairs. The first Philippine Embassy was established in Washington, D.C., with Joaquin M. Elizalde as

The work of rebuilding Manila got under way in 1945 with the help of U.S. army engineers. This bridge was erected to replace the destroyed Santa Cruz bridge over the Pasig river



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Philippines: Statistical Data

Item	1938		1940	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Exchange rate		1 Peso = 49.84 cents (2s. 6d.)		1 Peso = 50 cents (2s. 6d.)
Finance				
Govt. revenue	\$55,287 (\$11,308)		...	
Govt. expenditure	\$53,552 (\$10,954)		...	
National debt	\$74,469 (\$15,232)		\$73,454 (\$19,179)	
Transportation				
Railroads		817 mi.*		
Highways		11,697 "		
Airways		962 "		
Communication				
Telephones		24,046		
Telegraph lines		8,838 mi.		
Radio sets		29,175†		
Minerals				
Gold		903,265 oz.		
Iron ore		959,167 tons		
Silver		1,167,612 oz.		
Manganese ore		54,408 tons‡		
Crops				
Rice		1,683,035 tons		
Sugar		1,107,714 "		
Copra		769,201 "		
Corn		566,336 "		
Livestock				
Swine		3,558,274		
Carabaos		2,607,836		
Cattle		1,721,600		
Forest products				
Sawn timber		54,011,240 bd. ft. §		
Logs		197,683,640 "		
Gums and resins		49 tons §		
Exports—total	\$115,425 (\$23,609)	...	\$113,412¶ (\$29,611)	...
Sugar	\$49,862 (\$10,199)	952,000 tons||	\$39,495¶ (\$10,312)	...
Copra	\$12,217 (\$2,499)	245,000 "	\$13,472¶ (\$3,517)	...
Coconut oil	\$10,732 (\$2,195)	182,000 "	\$10,342¶ (\$2,700)	...
Abaca (Manila hemp)	\$10,126 (\$2,071)	30,000 "	\$12,529¶ (\$3,271)	...
Imports—total	\$132,183 (\$27,037)	...	\$144,586¶ (\$37,751)	...
Iron and steel manufactures	\$22,823 (\$4,668)	...	\$23,596¶ (\$6,161)	...
Cotton goods	\$21,836 (\$4,466)	...	\$20,563¶ (\$5,369)	...
Mineral oils	\$8,183 (\$1,674)	...	\$11,183¶ (\$2,920)	...
Automobiles and parts (including tires)	\$8,093 (\$1,655)	...	\$7,788¶ (\$2,033)	...
Defense				
Standing army personnel		11,000		11,000
Military expenditures	\$8,228 (\$1,683)		...	
Education				
Public schools				12,057
Enrolment in primary schools				1,572,639
Enrolment in intermediate and secondary schools				368,153
Enrolment in normal and technical schools				3,777
Private schools				439
Enrolment in kindergarten				2,844
Enrolment in primary schools				41,861
Enrolment in intermediate and secondary schools				73,633
Enrolment in collegiate schools				31,153
Recognized schools (vocational training)				136
Enrolment				9,188

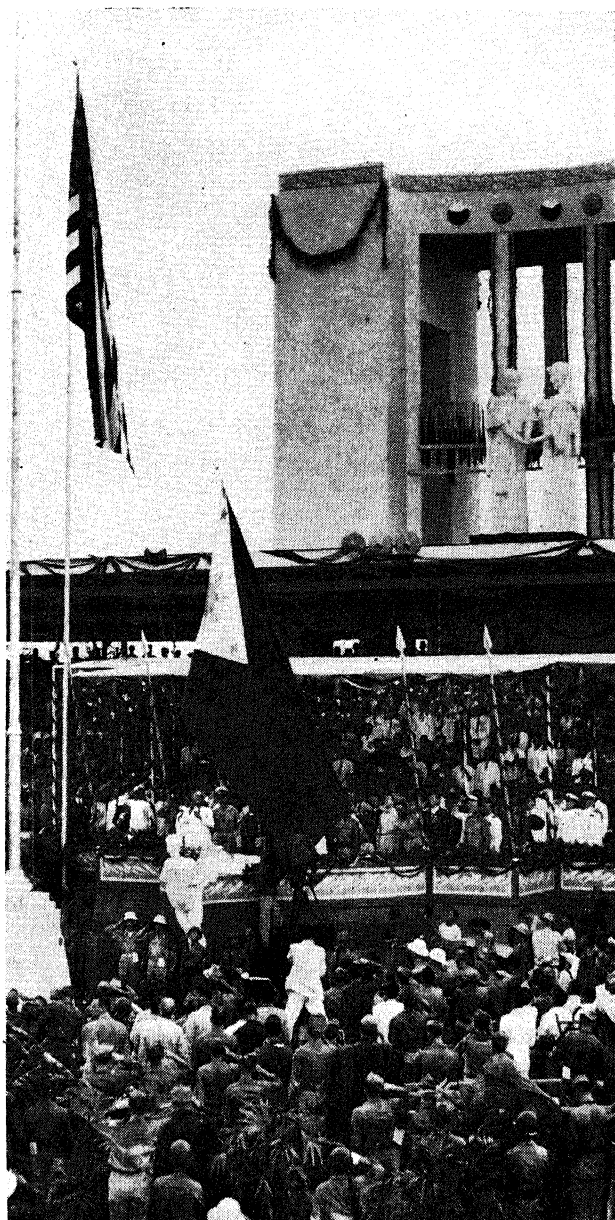
*Not including private lines on sugar plantations.

†1939. ‡Exports only. §1937. ||To U.S. only. ¶Fiscal year ending June 30.

Philoff, Bogdan Dimitrov

Philoff (1883–1945), Bulgarian statesman and archaeologist, was born April 10, 1883, in Stara Zagora, Bulgaria. He studied at the universities of Leipzig, Bonn and Freiburg in Germany and soon won a reputation as an authority on archaeology. Appointed conservator of the National museum in Sofia in 1906, he was promoted to director in 1910.

In Nov. 1938, Philoff was made minister of public instruction in the cabinet of Prime Minister George Kios-



The Philippine flag of red, white, blue and gold is shown being raised over Manila as the U.S. flag was being lowered, during the ceremonies marking the beginning of Philippine independence on July 4, 1946

first ambassador.

Thus the new republic was launched, in the midst of economic difficulties of staggering proportions. A land destroyed by war was brought forth upon the world scene as a new nation. In any other time in history, such a prospect would have been impossible. (See also GUERRILLA WARFARE; JAPAN; WORLD WAR II.) (M. ROX.)

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seivanoff. Following the latter's resignation in Feb. 1940, Philoff was made prime minister. During the early part of his tenure of office, he merely followed orders given by King Boris, who exercised dictatorial authority in governing Bulgaria. Thus, he dutifully followed the king's orders to act as middleman in arranging for the entry of German "experts" and "technicians" into Bulgaria in March 1941. While he professed an "unalterable" love for peace, he signed the axis pact on March 1, 1941. Subsequently, German troops in Bulgaria launched an offensive against Yugoslavia and Greece. After the death of King Boris (Aug. 28, 1943), Philoff, Prince Cyril and Gen. Nikolai Mikhov formed a three-man regency council to rule in the name of the boy king, Simeon II. Later Philoff resigned as prime minister. After Bulgaria's surrender to the Allies, Philoff was arrested (Sept. 21, 1944) and turned over to the soviet authorities. Tried for treason by a Bulgarian court at Sofia, Philoff, Prince Cyril and Gen. Mikhov were sentenced to death. Philoff was executed Feb. 1, 1945.

Philology

See LANGUAGES.

Philosophy

It would be fruitless to claim ten years of progress for the philosophy of the decade 1937-46, or even ten years of consistent stability. Whether it be the philosophy found in books or the more significant philosophy in the behaviour of people and in institutional tendencies, the decade, philosophically, was scattering and miscellaneous. Philosophy, like other expressions of the culture of the age, clearly was not at one with itself. As an aggregate it was heterogeneous, pluralistic, a sound of many voices saying different things.

This does not mean that some of those voices were not significant. Nor does it mean that uniformity among philosophies and philosophers is necessarily desirable. Block philosophy, without inner variegation, is more than likely the rationalization of an authoritarian dogma. Philosophical expression as an aggregate, however, lacked not only organizational unity but inner homogeneity as well during the decade. It revealed therein the basic cultural conflict and disorganization of the western world. Culturally it revealed not one world but many fragments, each with its universal pretensions. This disorganization became violently articulate in World War II. The outcome of that war, at least so far as the intellectual symbolization of experience was concerned, showed more rather than less disorder than before.

Nor were the opposing philosophies of this decade of conflict aligned strictly with the physical contestants. No one side had any one philosophy, although each side tried vigorously to force its mismatched doctrines into the same bed. Nevertheless, certain points of view emerged which seemed to characterize the decade and its conflicts. One was the ascendancy of a secular universal order and authority implemented by modern technology. This order was cosmic in range and inflexible in character. Though called the mass state, it really was the totalitarian or completely organized state. In reference to it human variations, values, choices were deemed invalid. The human personality as such was repudiated and the human being was reduced to one or more functional, specialized instruments which alone justified his participation in the state. As an array of functional, impersonal fragments he was absorbed

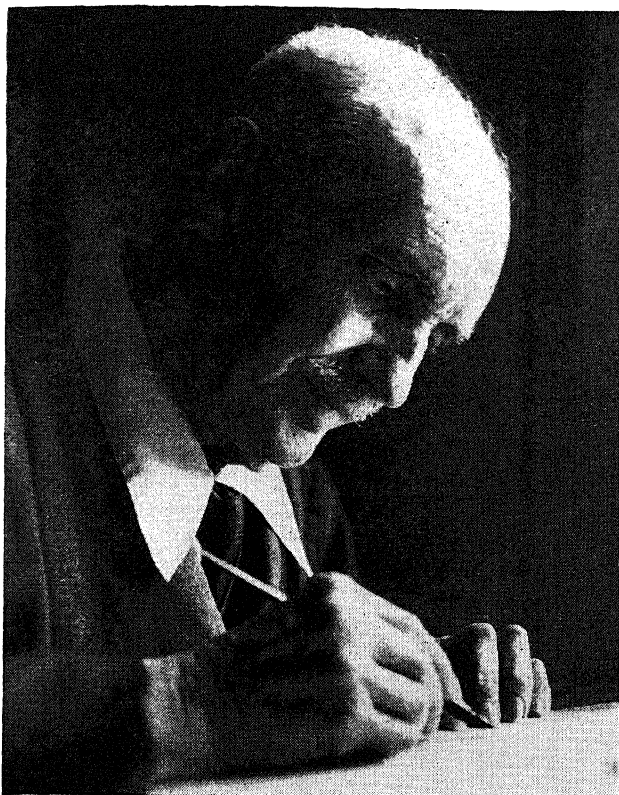
wholly into the state with no margin of significance beyond. This fragmentation of the human being into functional specializations was of course characteristic of mass organization everywhere, and no doubt was the source of most of the ideological conflict both internal and external of the dominant social groups. The so-called totalitarian states, however, overrode the protests of the philosophical humanists and carried the thesis to a logical but not necessary conclusion. Their point of view was based on a conception of science—a limited one—that had gained authority through the astonishing developments of modern technology and mechanism. Technological statism, an omnipotent statism, is a fairly descriptive term for it. (See COMMUNISM; FASCISM; NATIONAL SOCIALISM.)

In contrast to this point of view, and usually in conflict with it, was humanism. It too was often secular, though not always. It placed first value, not on the total organization of society, but on the integrated or whole human being participating by virtue of his essential human nature in a community of other human beings. Though this wholeness can be realized, of course, only through participation in the community, it is participation not as functional fragments of life but as a whole person. It would be an oversimplification no doubt to say that the decade was focussed in the struggle for survival of the human being and the human community against the disintegrative forces of technological, mass organization. Such a statement, however, would have a greater degree of truth than would be comfortable for western, humanistic philosophers to contemplate.

Authoritarian and Humanist Wings of Philosophy.—Philosophically this conflict was expressed by many writers. Of these the authoritarians were the frankest in stating their side of it. The mass of writing and preaching that flourished through part or all of the decade in Italy, Germany, Japan, Russia was given little scholarly attention by philosophers of Anglo-Saxon persuasion. They were nevertheless important, not for their imaginative or creative luminosity, but because they made massively articulate an authoritarian ideology, a philosophy of unmitigated power and concussion, that many liberal thinkers of the accepted academic tradition had naively assumed was long ago dead and gone.

These power philosophies of modern technological statism were for the most part violent restatements of the classics of their particular tradition. Hitler's *Mein Kampf* came to its climax of attention in the decade. The conscious virilities of Mussolini's balcony speeches, the eager pugnacities of Hideki Tojo and Isoroku Yamamoto, the Marxian reverberations in Russia, all were implicit with the philosophy of an emergent totalitarian culture and way of life. Though these philosophies were departmentalized according to national groups and differed markedly from each other, with the German deeply mystical, the Russian rationalistic and materialistic, the Japanese traditional and tribal, they were alike in being rigidly authoritarian, with the massive, overwhelming, technological state as the be-all and end-all of human endeavour.

In contrast to the authoritarians, the humanist philosophers as a group seemed diffused, unorganized and somewhat vaporous. No doubt they were indeed all of these things, for lack of explicitness and unity seems to be an occupational disease of theirs. It became evident, however, as the decade came to an end, that for all their lack of immediate, dynamic explicitness, they referred to implicit depths of human potentiality, to great unseen reserves of human value and power that resulted, at least for the time being, in ideological and physical triumph.



George Santayana at work in the Convent of the Blue Nuns, Rome, Italy. For his metaphysical writings in *Realms of Being* (Scribner's, 1942), Santayana was given the Nicholas Murray Butler gold medal for 1945, an award based on distinguished contributions in the fields of philosophy and education

Most of the philosophical writing of the decade of U.S., English, French or Scandinavian background was related in some way to this humanist point of view. So also was some of the German, Italian and Spanish writing until it was blacked out by war and totalitarianism. These various groups in the humane tradition may be listed tentatively as follows: The pragmatic-instrumentalist group that followed, in contrast to the totalitarians, the great liberal branch of the stream of science; the mystical group, religious and personally exploratory; the semanticists and logical positivists analyzing meaning; some mathematicians; the formal, more traditional humanists; the phenomenologists; the extremist fringe, such as the existentialists. To these may be added the agrarian distributists, sometimes called integralists, a group not much represented in formal philosophy, but important in their protest against mass operations and ideologies.

The Pragmatists.—The first of these humanist groups, variously called the pragmatists, humanists and instrumentalists, led by John Dewey, carried on the tradition that William James and C. S. Pierce had begun 40 years before. This highly significant modern philosophy was developed from one of two great streams of scientific thinking. From that aspect of science which is liberal and humanistic it arose in sharp contrast to the totalitarian ideologies which had been nourished so effectively on the other kind of scientific thinking, namely, mechanistic technology and authoritarianism. The difference was striking and fatal. It well may have been due to the fact that the humanists, unlike the authoritarians, had been willing to extend the concept of scientific experimentation broadly into the field of human values and life. Science to the humanist is a way to solve problems, a method of finding the humanly successful way which is truth. It is by no means limited

to the problems of material and power, but provides a way, says the humanist, to criticize these power objectives and to transmute them into harmonious parts of the general social order and good will. Dewey's books, *The Theory of Valuations* and *The Theory of Inquiry*, appeared during the decade. The volume on Dewey in the *Library of Living Philosophers*, edited by Paul Arthur Schilpp, brought together much of the more pertinent current criticism of this point of view.

The pragmatism and experimentalism of James and Dewey, though derived largely from science, had in its turn a reverberatory effect on many scientific thinkers. The atomic scientists, bomb makers, were in many cases evidently affected in their social and moral valuations by this philosophy. Though clearly lost, confused and innocently confounded when confronted by the sudden devastating consequences of their scientific technology, they struggled, futilely to be sure, but with the greatest of human good will, to criticize and control what they had brought forth. In many other fields, such as in the effort to unify science, scientists showed that they themselves, or at least their leaders, were closer to the liberal side of science than to the authoritarian. The many years, however, in which science had developed without benefit of philosophical thinking, began to exact their price. Whether science as an entire complex of operations could be liberalized or humanized remained doubtful.

The Mystics.—The mystical philosophy of the decade 1937–46 had several centres quite unrelated to each other. The translation of a large part of Søren Kierkegaard's work gave to many English readers their first access to the tense, mystical, fluttering thought of the Danish master. This significant influence very soon was carried outside of academic circles. The poet Wystan Auden and other literary men were caught in the spell, and migrant intellects, rebounding in some cases from the once fashionable literary communism, turned to it. It was influential even in such boulevard philosophies as existentialism.

At about the same time *The Gospel of Ramakrishna* was translated by Swami Nikhilananda; Aldous Huxley, Gerald Heard, the Quaker, and others were convening with Indian teachers and yogi in California, and Indic mysticism, far less disturbed, far more a quietude of thought than was Kierkegaard's, received a good deal of attention. Aldous Huxley's interpretive anthology of mystical writings, *The Perennial Philosophy*, and Sheldon Cheney's *Men Who Have Walked With God* helped to confirm this interest. Beyond all this a certain familiar mysticism in the comings and goings of life reasserted itself. For all the ascendancy of science, the world was less secure and less stable than before science captured the leading role. Mysticism was not inappropriate at such a time.

Semanticists.—The semantic movement that had begun outside of the circle of professional philosophers with books by Alfred H. Korzybski and C. K. Ogden and Ivor A. Richards in the early 1920s was one of the accepted problem areas in philosophy a decade later. The work of Ludwig Wittgenstein, the logical positivism of Rudolph Carnap and numerous papers in *The International Encyclopaedia of Unified Science* gave the semanticists philosophical authority, and what was in Ogden and Richards a limited analysis of the process of symbolization or word meaning became in the decade 1937–46 a philosophy with metaphysical implications (or rather an anti-metaphysical metaphysics). Like the pragmatists, experimentalists and early positivists, the new logical positivists rejected metaphysics

in that they were word references for which there were no observable referents. Just as the philosophical idealists before them had felt it necessary to analyze experience because all that we know is in experience, so the semanticists found that it behooved them to analyze the process of symbolization and verbal meaning because words after all surround and embody all our philosophical thinking. They were in general radically nominalistic. (See also SEMANTICS.)

The Mathematicians.—It is hardly justifiable perhaps to cite a philosophical group because its members are mathematicians. Modern philosophy like modern science is unusually endowed with mathematicians, however, and the tendency towards pure abstraction as over against the radical empiricism of a James or Dewey gives its own character to philosophical interpretation. It too is a kind of language with its own semantic codes. The more philosophical mathematicians of the decade, such as Bertrand Russell, A. N. Whitehead, Albert Einstein, were never captured by their own techniques, but the mathematical tendency to interpret the significant matters of the universe in terms of the abstract preciosities of pure quantities and numbers nevertheless continued apace. This was particularly true of some scientists when confronted by philosophical problems beyond the reach of their methodology.

Formal Humanists.—All the philosophies of the more liberal wing of modern thinking may be justly called humanistic. A group more formally humanistic than these may be set apart. It is a group loosely joined by a classical interest in the pre-scientific concept of human nature—the human being, namely, as an association of soul and body, of spirit and flesh, of matter and essence, of psyche, sensorium, intellect, emotion, animal faith or other faculties and components of the aggregative whole. In this group may be placed—mutually protesting perhaps—such different men as George Santayana, Jacques Maritain, R. M. Hutchins, Mortimer Adler and possibly Ernst Cassirer. Though Neo-Thomists, such as Adler, may have been frankly authoritarian, and though Santayana was no doubt more concerned in the aesthetic or appreciative aspects of experience than in love of human beings, their primary interest in the human epic and problem rather than in the philosophies of power, matter and cosmic technology placed them in the humanist group. Santayana's *Realm of the Spirit*, and the volume on Santayana in *The Library of Living Philosophers*, edited by Schilpp, were published during the decade. So also was Santayana's interesting analysis of the Gospels, *The Idea of Christ in the Gospels*. In *The Nature and Destiny of Man*, the social liberal and modernist, Reinhold Niebuhr, presented a surprisingly conventional doctrine of sin and salvation. In *An Essay on Man*, the post-Kantian philosopher, Ernst Cassirer, developed his theory of culture, in which he repudiated the naturalist's exclusive emphasis on science. He held that science is but one mode or structure of order among many others. These include language, myth, religion, art.

Phenomenologists.—New among the philosophic groups in the U.S. and England were the phenomenologists. With the translation of some of the work of the post-Kantian Edmund Husserl, the publication of a collection of essays in his memory edited by Marvin Farber, the foundation of the journal of *Philosophy and Phenomenological Research*, the publication of *The Foundation of Phenomenology* by Marvin Farber, and *The Philosophy of Edmund Husserl* by E. P. Welch, the movement was fairly launched.

Fritz Kaufmann and Felix Kaufmann were other members of the group.

Integralists.—A group which began with social criticism and moved to religious, moral and philosophical interpretation was variously called decentralist, distributist, agrarian or integralist. It was represented by the Catholic Englishmen, Hilaire Belloc and G. K. Chesterton, as well as many who were not Catholic. In the U.S. it was represented by an important social and religious movement within the Catholic church and to a lesser degree in the Protestant churches. Outside of the churches men so diverse as O. E. Baker of the U.S. department of agriculture, Frank Lloyd Wright, Ralph Borsodi, Baker Brownell, Henry Ford, Arthur E. Morgan, Howard Odum and the southern agrarians participated in it. From the moral and religious point of view the group held that the integrated human being is the final objective of social and educational endeavour and that the integration of human life is possible only in the true community. Modern mass industry, mass populations and centralized power destroy the true community and cause the disintegration of human values and life. A distributive economy and technology, a true community life and a natural and usually agrarian environment were considered necessary to human integrity and stabilization. Borsodi attempted to systematize and unify the field. Much religious thinking, including that of Aldous Huxley in *Ends and Means* and other works, turned in this direction. The movement had not matured philosophically by the end of the decade but represented a widespread, implicit protest against the cosmopolitan ideology of the period.

* * *

THE NINTH international Congress of Philosophy in Paris in 1937 set up six groups of problems for discussion. They were: (1) Cartesian studies; (2) the unity and methods of science; (3) logic and mathematics; (4) casuality in physics and biology; (5) reflective analysis and transcendence; (6) value and reality. In the following decade, the course of philosophy was at least to a considerable extent among those problems. The primary division in philosophy was and probably would continue to be between two interpretations of science: totalitarian authority and liberal humanism. The decade ended in general fear and anxiety, under the threat of the most recent instruments of science and technology, literally in the shadow of death. (See also LIBERALISM.)

The bibliography that follows documents this major philosophical conflict. It presents in addition some technically philosophical works of importance.

BIBLIOGRAPHY.—English translations of *Mein Kampf* by A. Hitler; John Dewey, *Freedom and Culture*; John Dewey, *The Theory of Inquiry*; George Santayana, *The Realm of Spirit*; English translations of Søren Kierkegaard's works; Ernst Cassirer, *An Essay On Man*; Bertrand Russell, *An Inquiry into Meaning and Truth*; Rudolph Carnap, *Foundations of Logic and Metaphysics*; *The Library of Living Philosophers* edited by Paul A. Schilpp: the volumes on Santayana, Dewey, Russell, Whitehead; Reinhold Niebuhr, *The Nature and Destiny of Man*; David Lilienthal, *TVA Democracy on the March*; Benedetto Croce, *La Storia come pensiero e come azione*; Bertrand Russell, *Critical Exposition of the Philosophy of Leibniz*. (B. B.)

Phoenix Islands

See PACIFIC ISLANDS, BRITISH.

Phosphates

Active fighting in northern Africa during World War II greatly reduced phosphate rock outputs in areas that normally had produced nearly 40% of the world output.

The year of maximum effect fell in different years in the different countries, and the minimum year and the percentage decline from the 1937 level were as follows: Egypt, 1941, 78%; French Morocco, 1942, 52%; Tunisia, 1943, 81%; and Algeria, 1943, 88%. By 1944, the output from French Morocco had recovered to 96% of the 1937 level, but the other three averaged only 36%. Including these declines, the loss of some of the island deposits to Japan and cuts in the U.S. exports, phosphate supplies outside the United States were seriously reduced.

Phosphate rock production in the United States during the war years was stimulated by the increasing demand for fertilizers to sustain the food supply. In 1945, at the end of the war, the demand for food supplies became even greater, with the necessity for relief shipments, bringing a record phosphate output in that year.

Between increasing output and declining exports, the available domestic supply increased each year beginning in 1938. In the postwar period, exports were expected to reach their former level or possibly even higher, but until agriculture in the war-torn countries could be more fully rehabilitated, it was more practical to use the phosphate to raise bigger U.S. crops, for shipment where they might be needed.

(G. A. Ro.)

Photography

During the decade 1937-46, photography forged ahead with important new developments, largely in technical applications and discoveries. New sensitized products, colour processes, optics, cameras and lighting materials were the result. More than half this ten-year period was devoted to a world war with photography put to its severest test. If the best of these war developments in photography could be put to constructive peacetime use, there would be some compensation for such a period of conflict.

War Photography.—Thousands of photographers scattered over the entire globe covered the greatest photographic assignment of all time—World War II. These cameramen followed all the military campaigns on land and sea and in the air. They covered the early aerial reconnaissance work when the Allied nations were frantically preparing their defenses and also carrying out their bombing missions. The aerial photographers were making over 20,000,000 photographs each month toward the end of the war. In addition to the mapping and aerial intelligence, photography was used for photographing enemy troop concentrations, spotting targets for bombers and studying the effects of bombing and shellfire and the effectiveness of camouflage.

Still and motion picture photographers covered the historic conferences at Casablanca, Tehran, Yalta and at Potsdam after the German surrender. Millions of photographs were made during the African and European invasions. From the Pacific came the photographs of the bombings and invasion of Luzon, Iwo Jima, Okinawa and the bombing of the Japanese cities. Then, in Aug. 1945, the photographers recorded the devastating atomic bomb explosions

Table I.—World Production of Phosphate Rock
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Algeria	695,721	644,248	551,067	408,836	492,221	365,337	84,655	242,893	?
Christmas Island	170,173	179,043	196,181	266,567	?	?	?	?	?
Egypt	569,897	505,304	603,557	202,234	123,137	362,043	348,954	350,739	?
Makatea Island	183,784	113,473	177,119	190,895	211,905	193,087	207,660	220,000	?
Morocco, French	1,655,415	1,595,644	1,877,206	806,860	563,873	803,500	899,373	1,592,732	1,802,280
Nauru and Ocean Isl.	1,128,952	1,306,036	1,371,573	1,391,541	?	?	?	?	?
Tunisia	1,952,677	2,132,090	1,794,025	1,309,351	1,186,217	969,751	368,919	575,699	778,606
U.S.S.R.	990,000	?	1,783,500	?	2,200,000	?	?	?	?
United States (sales)	4,430,932	4,187,947	4,207,915	4,483,024	5,252,410	5,201,549	5,741,380	6,021,840	6,503,530
Total (est.)	13,200,000	13,200,000	12,800,000	10,800,000	?	?	?	?	?

Table II.—Data of the Phosphate Rock Industry in the United States
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Mine output	4,772,786	4,323,733	4,466,526	4,556,246	5,512,845	5,397,211	6,014,363	5,936,002	6,159,708
Sales, Total	4,430,932	4,187,947	4,207,915	4,483,024	5,252,410	5,201,549	5,741,380	6,021,840	6,503,530
Superphosphate	2,679,314	2,324,872	2,457,032	2,873,745	3,165,631	3,632,932	4,068,720	4,124,147	4,420,650
Chemical uses	553,062	497,376	537,622	598,058	723,451	728,914	948,982	998,629	917,104
Direct fertilizers	145,326	120,865	141,972	155,900	195,638	240,183	249,336	309,953	479,400
Imports	15,008	7,847	3,920	3,307	4,861	4,217	52,086	138,224	158,657
Exports	1,179,138	1,277,742	1,062,887	841,674	1,142,355	592,162	400,971	490,709	429,972
Available supply	3,266,680	2,918,051	3,150,068	3,645,777	4,116,036	4,614,724	5,393,614	5,670,475	6,116,113
Stocks, mine	1,773,000	1,694,600	1,964,500	1,895,000	1,992,500	2,092,200	1,963,400	1,375,400	949,800

over Hiroshima and Nagasaki. Finally, on Sept. 2, 1945, the Japanese representatives signed the surrender terms on board the U.S.S. "Missouri" in Tokyo bay, and the world's greatest war photographic coverage had come to a close.

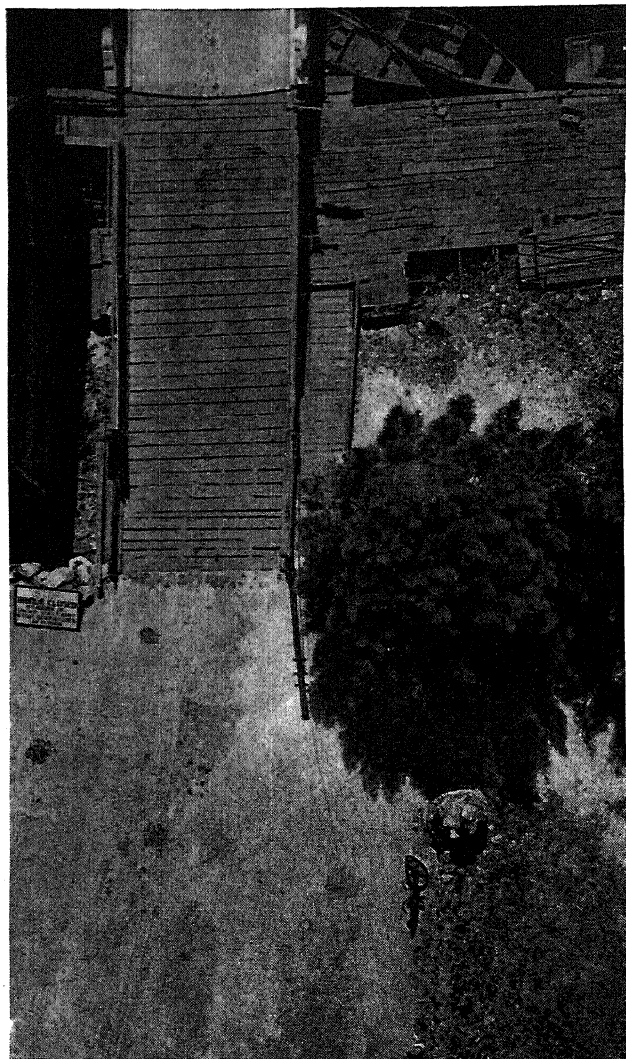
Aerial night photography was developed by the use of flash bombs timed to explode at desired distances below the plane and in such a position that the flash was just out of the field of view of the camera. Photoelectric devices, operated by the flash, were used to open or close the camera shutter. Aerial reconnaissance work was perfected to the point where photo interpreters could often determine what an enemy plant was manufacturing by studying the colour of the smoke coming from the chimneys or the colour of the refuse piles and by-products in factory yards.

The Fairchild Camera and Instrument corporation developed the Intervalometer, a device which automatically operated the aerial camera shutter at predetermined intervals ranging from 1 to 120 seconds. The production of such pictures improved the quality of aerial photographs and also made it easier for photo reconnaissance experts to assemble the hundreds of aerial pictures making up the photomontage maps used by military commanders. There was also a thermostat-control electric heater designed to keep the equipment at uniform temperatures during high-altitude flights.

Hundreds of training films were produced during the war to accelerate the training of soldiers for every branch of the military forces. These film production centres were located in Canada, England and the United States. Most of the training films for the U.S. armed forces were produced by the air force, the navy and the U.S. signal corps. Still photographs and slide films were also used extensively in the training programs. These productions were usually made on standard 35-mm. motion picture film; after final editing, 16-mm. prints were made for distribution to the various training centres. Most of these pictures were black-and-white sound films.

The Canadian National Research council together with the Fairchild Camera and Instrument corporation developed a high-speed ophthalmic camera for the Royal Canadian air force to photograph pilots' eyes to determine vitamin deficiencies. The resulting photographs showed the conjunctival blood vessels of the eye in sharp detail.

One of the most effective military and commercial instruments was the special camera designed for use in photographing radar images. The continuous radar images permitted military planes to travel over enemy territory



Remarkably clear in details, this photograph was taken from a single-seater U.S. army reconnaissance plane flying 310 m.p.h. at an altitude of 150 ft. The film unrolls past a slit in the shutterless camera at a rate which varies with the speed and altitude of the plane

at night or through heavy clouds and find their mark without ever seeing the ground with the naked eye. This product was known as the Fairchild automatic radar recording camera, and consisted of five units: camera, magazine, beamsplitter, adapter casting and control box. The complete camera installation was tied in with the radar circuit, and the camera itself mounted on top of the radar's oscilloscope. The unit was so arranged that the operator could observe the luminous picture of the terrain on the radar scope, while simultaneously the camera photographed it for continuous, permanent record.

A shutterless continuous-strip aerial camera was another important development. This camera made a continuous picture as the film passed across a narrow slit at a speed which was synchronized with the image which passed below the lens. The camera took 200 ft. of film at one loading. One continuous negative could be made or short lengths of the film strip exposed as required. Colour film or black-and-white film was used. The main use for this continuous-strip camera was in aerial reconnaissance work.

U.S. Army Pictorial Service.—U.S. combat photographers followed the progress of World War II so closely that their pictures appeared on the front pages of home-town newspapers within 24 hours. These men who fought with film

instead of bullets were responsible for keeping up civilian morale and at the same time contributing to total war coverage in pictures for training soldiers, accelerating campaign plans and for recording materials and equipment in action. Mathew B. Brady, the great pioneer in combat photography with his magnificent coverage of the American civil war, made his photographs on cumbersome glass plates, slow emulsions and with a bulky camera which required a tripod. In contrast to Brady the combat photographer of World War II was equipped with miniature cameras as well as the 4X5 Speed Graphic type. He had extremely fast films, infrared films for special night photography with infrared flash and also the use of small flash lamps which carried a light impact greater than sunlight.

The army pictorial service was formed with the major task of getting the message of military techniques to the millions of troops being trained in all branches of the service. Photographs were produced for identification, military and public information, historical record, V-mail and for all types of microphotography of documents, maps and similar material. The U.S. army pictorial service was part of the signal corps. At the close of the war, it had nearly 500,000 selected negatives in its files, culled from nearly 4,000,000 pictures made by the army and other services. Over 14,000,000 ft. of combat and production footage were in its film library. The V-mail units photographed over 1,000,000,000 letters. The war department used photography for five main purposes: documentation and historical record, news dissemination, technical study, strategic and tactical planning and training. It was the responsibility of the army pictorial service to fulfil these photographic demands.

After peace was declared, the army pictorial service started editing and compiling the complete chronology of the war from the millions of feet of motion picture films. Over 500,000 ft. of edited silent film together with narration and animation sequences was to be in this project.

During the war, the production of training films was only part of the photographic coverage. Photographers followed every landing operation and continued through the daily fighting. For example, in the Luzon invasion the army had 14 combat assignment units, 2 newsreel assignment units, 2 mobile laboratories and a photo repair section. Two other signal corps combat assignment units were with the navy. The total personnel consisted of 22 officers and 88 enlisted men in this photographic assignment alone. The three essentials for adequate photographic coverage were good equipment, personnel and full information.

The average combat unit included one officer, two still photographers, two motion picture men and a utility man. The newsreel units had one officer and nine men. Wide-angle lenses were commonly used for combat photography. Some of the Speed Graphic cameras were equipped with 10-inch long focus lenses.

Colour photography was not used very extensively for actual combat work. However, it was used a great deal back of the lines, for aerial reconnaissance, publicity and special training. The first colour photograph to be transmitted by radiotelephoto to the United States and published in some newspapers within 24 hours was that of the "Big Three" at Potsdam.

U.S. Navy Photography.—The photographic division of the bureau of aeronautics became the main production centre for most of the U.S. navy's photographic requirements. Like the army pictorial service, the navy started reviewing and cataloguing the thousands of feet of combat film which arrived daily from all theatres of operation

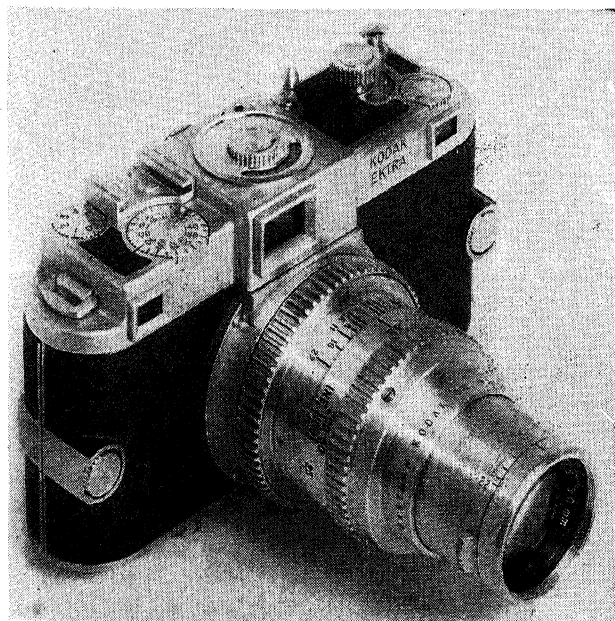
during World War II. Aerial reconnaissance was the most important part of naval photography. However, a huge training film program was also carried on at the same time. Some idea of the production of these films could be gained from the fact that within $3\frac{1}{2}$ years more than 1,100 navy training motion pictures, averaging 2 reels each, were produced. During this same period, more than 2,200 slide films were made to supplement the training program.

In order to facilitate the exchange of training film information and the distribution of training films themselves among the armed services of the United Nations, the United Nations Central Training Film committee was formed in 1942. The committee held regular meetings at The National Archives in Washington. Up to the end of the war, over 7,000,000 ft. of motion pictures produced for training were received and filed. During the same period over 3,800 slide films were received. The training films included almost 800 subjects from the British army and the R.A.F.

Important colour films were produced by the navy. Subjects included naval operations, training films, gun camera records, combat reports and historical records. Both 16-mm. and 35-mm. colour films were used to make the hundreds of training films. The live-action shots were made with 16-mm. colour, while the 35-mm. colour film was used for the majority of animation subjects. The bureau of medicine and surgery produced more colour films than any other bureau in the navy. The bureau of ordnance used colour slide films very successfully for instruction in the operation of complex gun mechanisms and wiring diagrams. The bureau of personnel replaced lengthy lectures by using colour motion pictures to train inductees in various skills. The psychiatrist used audio-visual aids successfully in the preparation of the background of emotional and mental health. By means of the motion picture, skilled physicians could present their message to large audiences and thus greatly aid the small corps of psychiatrists.

Out of all this accelerated photographic development for war and destructive purposes there was promise of a new development in the use of audio-visual aids for peacetime education and entertainment. The men who made

The Kodak Ektra, a 35-mm. precision camera first shown in 1940, usable interchangeably for black and white or colour film, with a compensating built-in view finder, a left-handed film advance lever and an anti-reflection f/2 50-mm. lens



these military training films began to use their valuable training for the production of new visual films in a changed world.

Sensitized Materials.—The basic recording material in photography remained the sensitized emulsion, mounted on a glass, film or paper base. Because of its importance, the sensitized emulsion was the focal point of intensive research during the decade 1937–46. Photographers were continually asking for faster films, finer grained emulsions and various colour-sensitive emulsions. With sensitizing dyes added to the photographic emulsion during manufacture, it became possible to have “tailor made” emulsions for almost every photographic purpose.

Until 1930, the use of sensitized dyes in emulsions had been quite limited. However, as the result of important research in the United States, England, France, Germany and the discovery of hundreds of new dyes, the modern emulsions could be sensitized selectively in all parts of the visible spectrum and also to the invisible infrared and ultraviolet portions. The panchromatic emulsion, sensitive to all colours, in its various forms became the standard emulsion in the professional fields. Amateur photographers were also quick to see the advantages of increased speed and colour sensitiveness in these new films. The former orthochromatic era of photography definitely changed to the panchromatic era.

The demand for increased emulsion speed continued in spite of the tremendous advances during the decade. As the speed of films increased new photographic uses developed. The news photographer could secure photographs in weak natural light where flash lamps were forbidden. The X-ray technician could obtain superior diagnostic results with less exposure and thus a saving in the life of the X-ray tube. The motion picture industry became dependent upon the new fast films.

Along with increased speed there was a demand for finer grained emulsions. Sound recording and microphotography developed tremendously with the new fine-grained emulsions which were unknown prior to 1936. The miniature camera flourished with the finer grained emulsions as well as the increase in speed.

During the early 1930s, the production of faster panchromatic films caused the grain of the emulsion to be coarser. This was not desired for small negatives which required enlargement because of the resulting loss in quality of the image. To overcome this drawback in the fast films, there was widespread use of fine grained developers which were extensively used up to about 1939. At that time, many of the developers used the toxic paraphenylenediamine as one of the chemicals. Another drawback was the loss in speed which resulted when films were developed in most of these fine-grained solutions. Finally photographers began to realize that they could get just as good, if not better, results by using the slower emulsions which insured excellent fine-grained results. Later improvements in fast films gave the amateur and professional photographer some of the finest emulsions ever produced. Better colour sensitivity, keeping qualities, finer grain and increased speed were now taken for granted in the modern emulsions.

It is interesting to note that in 1875 the photographer could only record one-third of the visible spectrum, while in 1946 he could photograph more than four times as much as he could actually see. By using the newly discovered sensitized dyes, the new emulsions were capable of photographing the invisible infrared and ultraviolet regions. This development extended the seeing range of the astron-

omer and the spectroscopist as well as the microscopist. Medical and industrial research also benefited.

A summary of the film developments by the Eastman Kodak company during the ten-year period from 1936 to 1946 is typical of the important advances in this field.

- 1936. Eastman Panchro Press film and Ortho Press plates were produced for the press photography field where unfavourable lighting conditions were met. Eastman also introduced 8-mm. Kodachrome as well as Kodachrome, Type A.
- 1937. Three new 35-mm. motion picture film emulsions were placed on the market; Fine Grain Sound Recording film, and negative and positive Fine Grain Duplicating films.
- 1938. As a result of significant advances in the technique of emulsion making, it was possible to bring out new films having high sensitivity and low grain. Three of these were Panatomic X, Plus X and Super-XX for the professional motion picture field. The new fast sheet films were Super Panchro Press, Super Ortho Press and Super-XX Panchromatic. The Kodalith group of films and papers were brought out for the graphic arts field.
- 1939. Tri-X and Ortho-X films were introduced, representing a very important advance in film speeds.
- 1940. Matte transfer films, for transferring drawings photographically to metal or plywood, came just in time for the accelerated war production period.
- 1941. Tri-X Aero Panchromatic film for night photography was the fastest emulsion then available. Kodacolor Aero Reversal film for aerial photography in colour and for processing in the field by the user.
- 1942. Kodacolor roll film and Kodacolor prints—a negative-positive colour process for use in amateur roll film cameras. Unlike Kodachrome, the colour-forming couplers are included in the film and paper coatings.
- 1943. Kodacolor Aero Reversal Film was announced publicly. Previously it had been used for military purposes.
- 1944. A neutral density integral mask was introduced into Kodacolor negative film to give improved quality in the final colour prints. Super Panchro Press Sports type was produced with about twice the speed of the previous types of extra-fast films used in press photography.
- 1945. Laboratory tests showed that the speed of infrared film could be increased many times.
- 1946. Ektachrome film announced. This colour film can be processed by the photographer.

As new requirements developed in all the important fields, the photographic manufacturers produced special emulsions. Some of these groups included: (1) industrial photography, (2) press photography, (3) X-ray, (4) photolithography, (5) sound recording and the duplication of motion picture negatives and (6) scientific photography. The cellulose film support was greatly improved in quality during the decade. The acetate film base was taking the place of the former nitrate support for much of the sheet and roll film. Along with these improvements, the modern films were free from abrasion, fog and halation.

Colour Photography.—The phenomenal development of colour photography for the amateur and professional during the decade was largely due to the introduction of Kodachrome in 1935. This was a monopack colour film based on the subtractive process, invented by Leopold D. Mannes and Leopold Godowsky, Jr. and developed by the Eastman Kodak company. Kodachrome film is composed of three separate emulsions on one side of the film base, with gelatin layers between each emulsion. The three emulsions respond to red, green and blue light. By placing a yellow dye between the top emulsion and the lower two emulsions, blue light is held back and reacts only on the top layer. When the Kodachrome film is exposed in the camera the blue, green and red light is recorded upon the different layers according to the sensitivity of each to the three primary colours.

As processed in 1946, the three exposed layers were de-

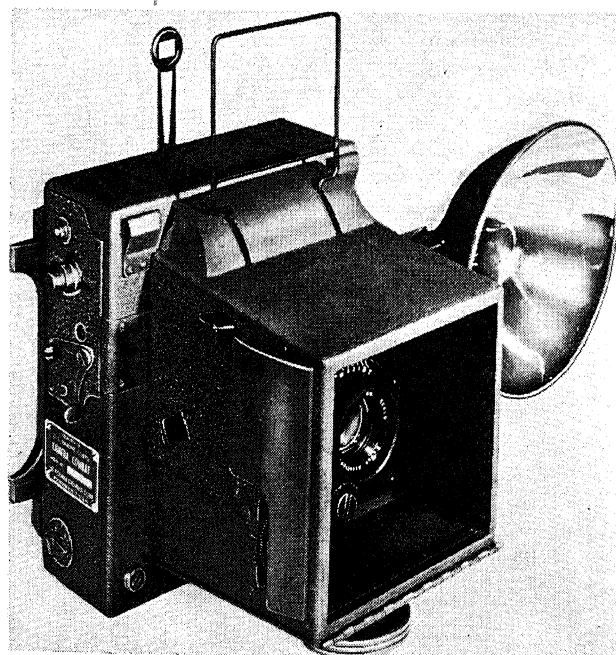
veloped to positives and then by the reversal process converted to the final full colour positive representative of the original subject. Yellow, magenta and cyan dyes formed the final colour positive. The colours of these dyes were thus complementary to the blue, green and red light which was originally recorded on the three separate layers of the film. As these layers of colour were so thin and close, the final full-colour image looked like one emulsion.

The positive colours were created by the use of coupler development. This method was based on the fact that when a developer reacts to silver bromide to create a silver image, oxidation takes place which in turn reacts with selected chemicals to form dyes. Thus the final images were made up of the coupler and the dye.

After the first development of Kodachrome to obtain the negative silver images in the three different layers, a red light is used to expose through the base of the film. As a result, the unexposed silver bromide areas in the bottom layer react to the red light and when placed in a coupler developer a positive blue-green or cyan image is produced. The other two layers are not affected by this processing because they are only sensitive to the blue and green light. In the next step, the top, or blue sensitive layer of the film is exposed to blue light followed by coupler development to make the yellow image. This leaves the middle undeveloped layer between the top yellow positive and the lower cyan positive. A magenta coupler is then used for developing the middle layer to complete the three colour positives which include the dye and also the silver. The silver is then removed by a bleach bath and the film is fixed, washed and dried. The final result is a beautiful colour image composed entirely of insoluble dyes and without the silver grains.

Kodachrome was first introduced in the 16-mm. size for ciné photography. In 1936, the 8-mm. size became available and the amateur home movie field received a tremendous increase in popularity with the new colour film. During the next two years this colour emulsion was made available on sheet films up to 11x14 in. in size. In 1939, the Eastman Color Temperature Meter was introduced to enable the photographer to evaluate the colour quality of

The Graphic 45, a combat camera released in 1944, was specially designed to resist dust and water



his studio lights. The Harrison Light Corrector became available for a similar purpose a few years later. The Eastman Kodak company's Hall of Color at the New York world's fair fired the imaginations of thousands of visitors. Colour photographs were at last available to every photographer for still and motion picture photography. A new era of colour was at hand.

By 1941, Kodak Minicolor prints were being made from miniature Kodachrome transparencies. Kotavachrome professional prints from Kodachrome sheet transparencies were also made available. As World War II accelerated in intensity, Kodacolor Aero Reversal film for aerial photography in colour and for processing in the field by the user was ready for military use. This was the fastest colour film available with a speed of Weston 32. This film had a fairly high contrast to overcome the flattening effect of aerial haze. A special emulsion was also available for making duplicate transparencies from the colour originals. These duplicates had a diffusing support to permit direct viewing by transmitted light.

Kodacolor roll film and Kodacolor prints, a negative-positive colour process for use in amateur roll film cameras, appeared in 1942. Unlike Kodachrome, the colour-forming couplers were included in the Kodacolor film and paper coatings. This film is first exposed in the camera and then developed to a colour negative followed by printing onto paper to produce the final colour positive. In the Kodacolor negative the colours are reversed or complementary to the original colours in the subject. The same type of coating is used on the paper prints. When the colour negative is exposed on the print the final colours are produced similar to the colour in the original subject. In 1944, a neutral density integral mask was introduced into Kodacolor negative film to improve the quality in the final colour prints.

Soon after the introduction of Kodachrome in the United States, the new Agfacolor was announced in Germany. This new multilayer colour film was available for miniature cameras and amateur motion pictures. Agfacolor differed from Kodachrome in that the colour forming components were incorporated in the layers at the time of manufacture. In Kodachrome processing, the colours are added one at a time to each layer. Agfacolor could also be developed as a complementary negative from which direct colour prints were made. This film could be processed by the user.

Each emulsion layer of Agfacolor contained colourless dye-coupling components forming the yellow, magenta and cyan colours in the different layers when the film is developed. Ordinarily negative silver images were formed during the first development. The film was then exposed to white light which reacted on all the undeveloped silver halides in the layers to make the positive images. The colour-forming developer of the paraphenylenediamine type produced the positive silver image. During this process, the colourless dye components already in the film combined with the reaction products of the colour developer to produce the yellow, magenta and cyan colour images in each layer. At this stage the film contained both the negative silver image and the positive dye image. A potassium ferricyanide reducing solution was then used to remove all the metallic silver from the different layers and left where the original emulsion was blue-sensitive, a magenta dye image in the centre green-sensitive layer, and a cyan image in the red-sensitive layer next to the film base.

Anso Color film was developed in the United States by Anso and made available for military and government use in 1942. This integral tripack type of colour film was based



The Kodak Medalist, a roll-film camera placed on the market in 1941, took $2\frac{1}{4} \times 3\frac{1}{4}$ in. pictures and featured many of the characteristics of the miniature camera. The improved Medalist II, shown above, was introduced in 1946 with a built-in flash shutter

on the same process of manufacture as the Agfacolor film made in Germany. It was the first colour film which could be processed by the user without the need of special equipment. The following year Anso Color was available for essential war industries, and by 1945 it was in use by amateur and professional photographers. This new colour film could be processed by the photographer in his own darkroom.

Ektachrome film was announced by Kodak on Aug. 26, 1946. This new colour film had soft gradation and brilliance in rendering excellent reproductions of the original subjects. However, the main feature of the new Ektachrome film was that the photographer could do his own processing of the film after exposure. This feature was important for news, syndicate, commercial and illustrative photographers, who could have finished colour pictures within a few hours. A newspaper could now have its colour pictures ready for use within ten hours from the time the original exposure was made. The developers used for processing Ektachrome did not have a toxic effect on the skin, as did some of the other colour finishing processes. The exposure factor for Ektachrome Daylight Type film was the same as for Professional Kodachrome.

Colour Prints.—Colour printing on paper was largely done by the Carbro and wash-off relief processes for commercial photography. The Autotype company in England was furnishing the tissues used in Carbro printing. Later the Devin firm and others in the United States produced these materials. Chromatone was a colour printing process introduced by the Defender Photo Supply company, but this was later discontinued. Kodak started a colour print service in 1941 with the making of Minicolor and Kotavachrome prints from miniature Kodachrome and Kodachrome sheet films. The printing material was similar to Kodachrome except that it was coated on a white cellulose acetate base. Anso also produced a printing method similar to Anso Color in 1944, which was also used on a white film base for positive prints from colour transparencies.

A number of colour printing services were started by

private companies for the production of colour prints. One of the first of these was Triak, which discontinued its services when the war started. After the end of the war the Pavelle Color printing service started on Oct. 26, 1945. It was the first company outside of Kodak to use automatic colour printers for continuous processing methods. Its printing machines had a capacity of turning out 20,000 3x4½-in. colour prints from miniature colour transparencies per day. A few months later a printing service for 5x7-in. and 8x10-in. colour prints was available.

In 1943, Ansco colour paper was available for the U.S. armed forces and for essential industries. This material had a multilayer emulsion with incorporated colour components coupling with the developer by-products to produce direct colour prints. Colour prints were made from either colour-separation negatives, successively exposed through three colour-separation filters, or from complementary colour negatives (single exposure). Ansco colour paper was used in the preparation of military maps in colour and also for making machine drawings and wiring diagrams to facilitate line production of intricate devices in factories.

Ansco Color Reversible Printon was announced in 1944. Colour transparencies could be printed on Printon in much the same way as black-and-white negatives were printed on sensitized paper. A sheet of Printon was given a single exposure through the colour transparency either by contact printing or enlarging. After processing the exposed Printon sheet the result was a full-colour picture similar to the original transparency. The basic principle

of Printon was simply that of reproducing in the three Printon layers the three dye images of the original transparency. Printon closely resembled Ansco Color Reversible film in structure and in the principles on which it was based, although the two materials were modified to adapt them for different purposes.

Kodak introduced the dye transfer process in 1945, an improved and simplified wash-off relief process for colour print making.

Technicolor films in the professional motion picture field were greatly improved in quality during the decade 1937-46. The early Technicolor films looked very crude with their limited colour range as compared to the later prints with their spectacular colour rendering. Technicolor printing depended upon the wash-off relief or dye transfer process in which the gelatin layers were stained with the appropriate dyes after the three separation images were printed onto the positive. In 1942, Technicolor started to use 16-mm. Kodachrome for making some of the originals for their 35-mm. Technicolor prints. A number of combat motion pictures made with 16-mm. Kodachrome were released to the theatres by printing onto Technicolor.

A number of colour processes which appeared during the decade did not become widely used. Dufaycolor film, a screen-unit additive type colour film, was available in motion picture film and also still camera sizes. However, the screen pattern of Dufaycolor film was somewhat objectionable and the other colour films which gave fine colour

Exploding bomb, photographed at 1/270 sec. at the army's Aberdeen proving ground in Maryland. Bright streaks indicate the paths of fragments of bomb casing travelling faster than two miles per second



tones without any screen or grain pattern were preferred. The Finlay colour process, also a screen-unit type, was used for commercial illustration until Kodachrome became available in sheet film form. Several short-lived colour processes were of the lenticular base and dupac types. Gasparcolor was another process which was still in the experimental state, although some materials were available for military purposes.

The Photographic Process.—Along with the many developments in sensitized products, there naturally followed new procedures and formulas for processing. Until 1936, the toxic paraphenylenediamine chemical had been used extensively in many of the fine grain developing formulas. The processing formulas for the larger films were pretty well standardized with the use of the same chemicals which had been available for many years. In 1934, however, Kodak had introduced a new alkali known as Kodalk to replace the common carbonate. In 1937, Harold Harvey produced the first fine grain developer and replenisher combination known as Panthermic 777. Until that time, the exhaustion of developing solutions was not seriously taken into account in most amateur work. The first few negatives in a solution would have good quality, while later negatives developed in the same solution would usually have a poorer quality caused by the developer exhaustion. Harvey worked out an accurate system for replenishment after each film was developed. In this way the tenth or twentieth film would have the same developing time and contrast as the first film to be used in the solution.

Photographers eagerly followed all the new literature on their favourite subject and tried out the new solutions as they appeared. It was an era of great experimentation on the amateur's part. The research laboratories made slow but valuable progress in producing new developers and processes. Concentrated liquid developers and fixers were produced. Rapid processing solutions were made for the press photographer and others who had to meet quick deadlines with their pictures. In 1939, the Eastman Kodak company put out a fine grain developer without paraphenylenediamine known as DK-20, which consisted of an Elon developer with sodium thiocyanate for producing fine grain. Many of the photofinishers used this developer for their fine grain developing.

Ready-mixed chemicals in attractive packages became quite popular. For many years the photographer had weighed and mixed his processing chemicals. But with the low cost and convenience of packaged developers, fixers, toners and intensifiers the photographer was quick to adopt these new short cuts in his work. In 1941 Ansco brought out a fine grain developer known as Finex, which gave good negative quality without loss of film speed. During World War II, Kodak developed a tropical pre-hardener which enabled the processing of photographic negative materials at prevailing temperatures in the tropics without deleterious effects, physically or sensitometrically. The solution contained formaldehyde, sulphite and an antifoggant. Negatives could be developed at temperatures up to 110° F. An extensive investigation of the washing of photographic film and paper products was also completed. It was found that sea water could be used successfully in reducing the washing time.

Ammonium thiosulphate was added to the fixing bath as a rapid fixing agent. This chemical could be used in place of hypo (sodium thiosulphate). It was valuable for the quick processing of aerial reconnaissance films and also for industrial uses such as in the rapid processing of X-ray films.

Many other improvements in processing methods ap-



Low level "shots" such as this one of Normandy beach defenses were photographed along the French coast from Calais to Cap de la Hague prior to D-day, 1944. Results of such hazardous missions provided realistic material for briefing invasion forces

peared during the decade, including newly packaged chemicals. Some of these, which appeared in 1945, were: Kodak Dektol, a long-life paper or film developer; Kodak Microdol, a new improved fine-grain developer; Kodak Versatol, a new liquid all-around developer for films, plates and papers; Kodak Selectol, a clear working developer for professional papers; Kodak Antical, a sequestering agent for prevention of scum and sludge formation in photographic developers; Kodak Rapid Liquid Fixer (with hardener) and Kodak Universal MQ Developer; also Kodak Anti-foam, a clear, colourless liquid for prevention of foaming of photographic solutions. F. W. H. Muehler and J. I. Crabtree devised a quinone-thiosulphate intensifier which produced a greater degree of intensification when used with high speed negative materials.

Flash Photography.—Synchronized flash photography revolutionized photographic methods and cameras in almost every field. The photographer was no longer dependent upon sunlight or the usual artificial illumination when he was equipped with camera, synchronizer and flash lamps. The ordinary flash lamp reached its peak of illumination within 20 milliseconds, and the ordinary between-the-lens shutter on a camera took about 5 milliseconds to reach full opening. In order that shutter and flash lamp would coincide a flash synchronizer was placed on the camera. The flash synchronizer consisted of a battery case, holding two or three 1½-volt dry cells, the flash lamp socket and reflector, and the tripper, mounted on the lens shutter. When a picture was to be made, the release button

on the synchronizer was pressed to close the electric circuit through the mechanism. This current went to the flash lamp first to ignite the primer coating, surrounded with aluminum shredded-foil in an atmosphere of oxygen. The burning primer thus ignited the aluminum and the entire contents of the bulb burst into a brilliant flash of about 1/40 sec. duration. The tripper on the shutter was automatically operated so that the shutter would reach its full opening when the flash lamp was at its peak.

Midget flash lamps, introduced shortly before World War II, were much smaller than the average flash lamp, easier to carry in the photographic case and quick to use. Amateurs and press photographers used these midget flash lamps in greater quantities until, in 1946, the majority of flash lamps sold were of the midget type. During the war, the blackout flash lamps were widely used. These lamps had an infra-red coating on the bulb and when flashed were practically invisible. They were used with infra-red film in the camera for making the exposures. There were

Edward Steichen assumed supervision over all navy combat photography in the summer of 1945. He is shown on an island platform of the U.S.S. "Lexington" off Tarawa



also blue-coated flash lamps for use with Kodachrome, Daylight Type film.

Some of the pioneers in the manufacture of flash synchronizers included the Heiland Research Corp., the Kalart Company, Inc. and Mendelsohn Speedgun Company. In 1942, the Ilex Optical company brought out a complete shutter with the synchronizing mechanism built into the shutter. Cumbersome flash synchronizer attachments were normally mounted on the camera body and outside camera shutters. With this new Ilex synchro-shutter, everything was built right into the shutter mechanism. Adjustments were provided for setting time delays from 0 to about 30 milliseconds. With this range of settings, all types of flash lamps could be used—such as the Kodatron Speed Lamp, reaching its flash peak at 0 milliseconds; the SM midget lamp, peaking at 5 milliseconds; the No. 22 Photoflash, peaking at 20 milliseconds, and the No. 3 Superflash, peaking at 30 milliseconds. It was the first synchronizer made for universal use with all flash lamps.

The pioneer work of Ilex was soon followed by Wollensak Optical company, Graflex, Inc. and Kodak in the production of the high speed Rapax, Graphex and Supermatic shutters with built-in synchronization. The built-in shutter synchronizer was probably as important to flash photography as the introduction of panchromatic films were to photography in general.

Flash lamps were taken off the amateur market during World War II and were obtainable only by commercial photographers on special priorities. Enormous quantities of flash lamps were used in the armed services. A year after peace was declared the flash lamp manufacturers were far behind in filling all the orders because of the unprecedented demands from amateurs, professionals and military sources. The field of flash photography expanded continually.

Lenses.—In 1941, a new type of nonsilica optical glass of high refractive index and low dispersion was introduced for making lenses for aerial cameras. This new glass represented a revolutionary scientific advance and undoubtedly was the first basic optical-glass discovery since the introduction of the famous Jena glass in 1886.

Still another basic improvement in lens manufacture was the successful use of surface coatings for the reduction of surface reflections in lenses. Various methods had been tried, but it was not until Professor John Strong published a description of his method that lens coating began to be used extensively. Strong's method provided for a thin film of a crystalline material which could be evaporated and condensed upon the glass under a vacuum. Later research improved upon this process until, by the end of the decade, coated lenses were sold by all lens manufacturers. With this surface coating, from 5% to 15% of the unwanted light reflections within a lens could be eliminated. The coating was also used on binoculars to give a higher light transmission and better viewing quality.

The first Kodak Ektar 14-in. $f/6.3$ lens appeared in 1939. In 1942, new Ektar lenses in focal lengths of $8\frac{1}{2}$ in., 10 in. and 12 in. were made. War demands led to the development of new lenses in England and the United States. With the aid of the new rare-element glass, the lens manufacturers were able to produce products which not only matched some of the best continental lenses but in many cases showed superior qualities. One example was the monster 48-in. $f/6.3$ lens made by Kodak for aerial photography. This lens had a thermostatically-controlled electrical warming device in the mount for use in the cold upper regions. Without this heating device the lens would shrink enough at low temperatures to throw it out of focus,

Objects up to five miles away were clearly revealed. A new lens cement was produced by Kodak to meet the extremes of heat, cold and high humidity encountered in desert fighting and stratosphere flying. Previously a large number of lenses had been cemented with Canada balsam, which cracked and discoloured under extreme weather conditions.

High-Speed Photography.—Development of high-speed still and motion pictures was important in the production of war materials and in the research laboratories. Harold E. Edgerton developed the high-speed 'stroboscopic' lighting for making as many as 600 exposures on one film. The same type of lighting was also applied to high speed motion picture cameras, which made several thousand exposures per second. This type of photography was quickly applied to many industrial production problems. The air movements around propeller blades was studied, machine defects were easily detected and many ballistic experiments were carried out. The high-speed motion pictures were projected at normal speed, and the cutting edge of a machine tool or the oscillation of synchronous motors gave up their secrets in slow motion.

Edgerton also developed the gaseous discharge speed lamp which flashed in 1/10,000 second. As no camera shutters could operate at such a high speed the speed lamp flash served as the only shutter. The camera shutter was opened and closed at a normal speed of possibly 1/50 second. During this operation the flash was discharged when the shutter was wide open. By the use of speed lamp photography all types of fast motion could now be recorded for study. The secret of a bird's flight was revealed along with the efficient or inefficient action of a fan turning at full speed.

Robert W. Cairns developed the rotating-drum camera, used to photograph the detonation waves of explosions, travelling 5 to 25 times faster than sound. This camera recorded explosions of 1-kg. charges about 6 in. long. A slow explosion is one that lasts about 100-millionths of a second. This high speed camera was used to record all the details of the activity of explosions for military purposes.

To gain knowledge about the behaviour of rockets during the early part of their flight, the Ribbon-Frame camera was developed by C. N. Hickman of the Bell Telephone laboratories. The camera used a standard No. 122 film, 3¼ in. wide and 35 in. long. The film was carried past a .15-in. slit, and each frame was thus .15 in. high and 3¼ in. wide. More than 200 frames could be taken on a single film. The exposure time was adjustable from .0001 to .0006 sec. A dial on the outside of the camera indicated the amount of unused film. As the rocket or shell was fired, the clutch button was pressed, thus connecting the film roll to the drive and a set of exposures made in rapid sequence.

Amateur Photography.—The field of amateur photography cut through every class and profession. The school boy or girl became just as enthusiastic about photography as the older person. Estimates showed that there were at least 25,000,000 cameras in the United States at the end of the decade 1937-46. During World War II, the majority of these cameras had to be laid on the shelf, but in the postwar period there was more activity than ever in the making of snapshots. The amateur could now purchase panchromatic films sensitive to all colours; high speed and fine grain films; and for the first time he could extensively use colour roll film. Cameras were more compact and were fitted with faster lenses. New enlargers and many new accessories developed during the decade contributed to the expansion of photography.

Because of the priority requirements of the various

military departments, photographic materials were extremely scarce for the general public during the war. However, by March 1944, the War Production board freed from its restricted list all photographic products which had a retail price of ten dollars or less. Following this ruling, the Office of Price Administration fixed ceiling prices on used photographic equipment. By the end of 1944, Photoflash and Photoflood lamps were again available for the amateur in restricted supply. Film rationing continued throughout the war years in order to give a more equitable distribution among amateur photographers.

Hundreds of new camera clubs were formed during the decade. Conservative estimates showed that the number of clubs more than doubled during this period. By 1946, there were more than 10,000 active camera clubs in the United States and hundreds more in Canada and England. One of the contributing factors to this rapid development in photography was the deluge of photographic literature which appeared in new photographic magazines and books. Many an amateur was often better informed about his subject than some of the old time professionals.

New photoelectric exposure metres took the guess-work out of picture making. Better picture results raised the enthusiasm of the amateur as he took more photographs and continued to maintain his interest. Photoflash and Photoflood lamps were still another factor in the new popularity of photography. With these lamps the photographer was completely free to make his exposures wherever he wished. The popularity of the 2x2-in. colour slide created new demands for the miniature camera using 35-mm. film.

Amateur movies on 8-mm. and 16-mm. films were taken in record volume. Kodachrome colour film, first introduced in 1935, was widely welcomed by all amateurs using 16-mm. cameras. Then, during the following year, this popular colour film was made available for 8-mm. home movie cameras. New ciné cameras and accessories followed in rapid succession until there were over 400,000 amateur movie cameras in the United States alone. With the development of sound on the 16-mm. films, the amateurs became still more enthusiastic. During World War II the greatest progress in 16-mm. sound motion pictures was made in the U.S. military services, where huge training film programs were prepared. By 1946 the sound projectors were again available to the public, along with many improvements in quality.

The Land Camera.—Announcement of a camera capable of producing a finished photograph in one minute caught the instant attention of all photographers in Feb. 1947. During the preceding century of photographic progress the camera operator had relied on making a negative and then carrying out a lengthy processing technique before obtaining the final photograph. By use of this new quick photographic process, invented by Edwin H. Land of the Polaroid corporation, the photographer could actually produce a finished photographic print from a negative within 60 sec. This Land camera seemed destined to be as important a factor in the development of photography as was the introduction of the dry photographic plates in 1874, replacing the wet plate processes.

Any conventional camera could be adapted to use the Land quick-print process, with the addition of two small rollers on the camera back similar to a clothes wringer. The negative film is loaded in one end of the camera and the special paper in the other. After a picture is snapped, a turn of a knob on the side of the camera advances the

film and paper out of the camera, through the rollers. The rollers press the film and paper into a temporary sandwich. When they are peeled apart a minute later the paper has become the finished print.

The automatic processing of the minute-print is carried on within the sandwich without tanks or other devices within the camera. When the sandwich passes through the rollers the pressure breaks a tiny pod or sealed container attached to the special paper at regular picture intervals. This pod releases a few drops of a viscous chemical mixture which spreads in a moist layer between film and paper. The chemicals develop the negative and simultaneously form the positive print. The opaque outer surfaces of the film and paper prevent the negative from being fogged by light when it is pulled out of the camera in sandwich form. Film and paper are then separated and picture is ready for use.

The few drops of viscous chemical released within the paper and film sandwich, when the winding knob sets the rollers in operation, contain both developer and hypo. Both chemicals go to work promptly—the hydroquinone turning the exposed crystals into silver on the film and the hypo taking into solution the silver of the unexposed crystals. The exposed crystals of the negative image are turned into silver and kept within the film out of circulation. The silver from the unexposed crystals, however, is free to move. The hypo takes this silver into solution within the thin layer of reagent between paper and film where the chemicals develop and deposit it onto the paper to form the positive image.

The developer performs the double service of holding silver of the exposed grains out of circulation in the negative, and forming the positive image from the silver carried into solution by the hypo. The hypo performs a shuttle service, carrying the silver in the unexposed crystals from the film to the paper, and returning for more when its load of silver complex has been taken from it by the other chemicals.

Miniature Photography.—Miniature camera photography came to a climax of its progress during the decade 1937–46. This development in photography had its start with the Leica camera, first introduced to countries outside of Germany in 1925. The photographers were slow to accept this small camera, which made 36 double-frame pictures on standard 35-mm. motion picture film. By 1930, the Leica was fully accepted by many amateur and professional photographers. Interchangeable lenses, dozens of accessories and improvements in the Leica models followed. In 1935 the 500-page *Leica Manual* appeared, the first book of this size ever published on one type of camera. By 1936 the Leica camera was in great demand, and miniature camera photography was really in full flower.

Other miniature cameras soon made their appearance, such as the Contax and Retina, using 35-mm. film. Many low priced 35-mm. cameras were being sold by 1939. Then, in Aug. 1940, the Kodak Ektra was announced, although actual deliveries of this 35-mm. camera did not start until 1941. A new line of miniature cameras appeared in 1938 known as the Kodak 35s. Many of the miniature cameras appeared in new models with faster lenses and some with built-in range finders for more accurate focusing.

Factors contributing to the popularity of the miniature cameras included the following: (1) New fast panchromatic 35-mm. motion picture films were produced, and also films with finer grained emulsions; (2) New fine grain developers were perfected to insure the production of fine quality

negatives which would stand great enlargement; (3) The new fast lenses with apertures of $f/2$ and $f/1.5$ captured the imaginations of photographers who were now able to photograph in dimly lighted places; (4) The candid type of photograph had its greatest novelty during this period because of the ease with which the miniature camera photographer could obtain all kinds of off-guard photographs of people; all this created new demands for these small cameras; (5) By the time Kodachrome 35-mm. film was available, the miniature camera was really in great demand. Photographers could now make a series of colour pictures in any 35-mm. camera and later project these colour images when mounted in the popular 2x2-in. lantern slides.

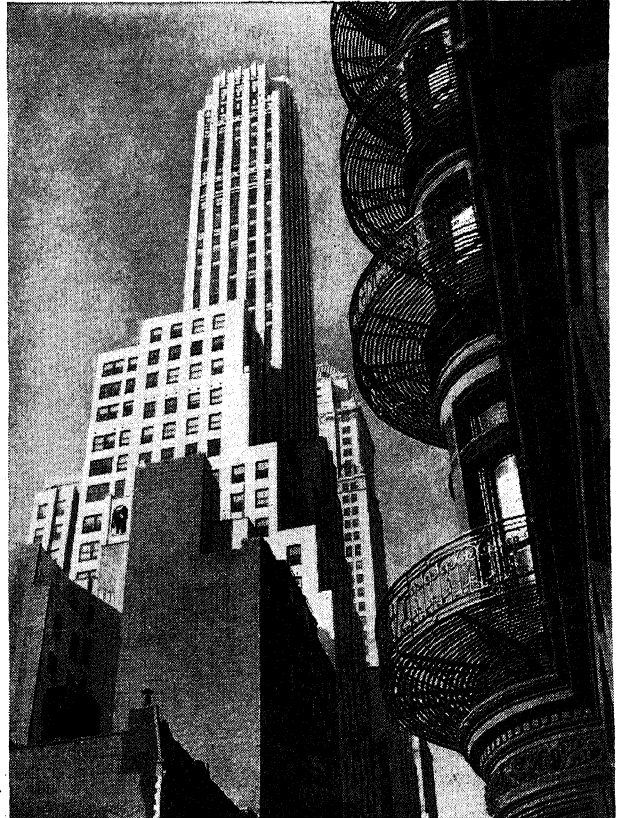
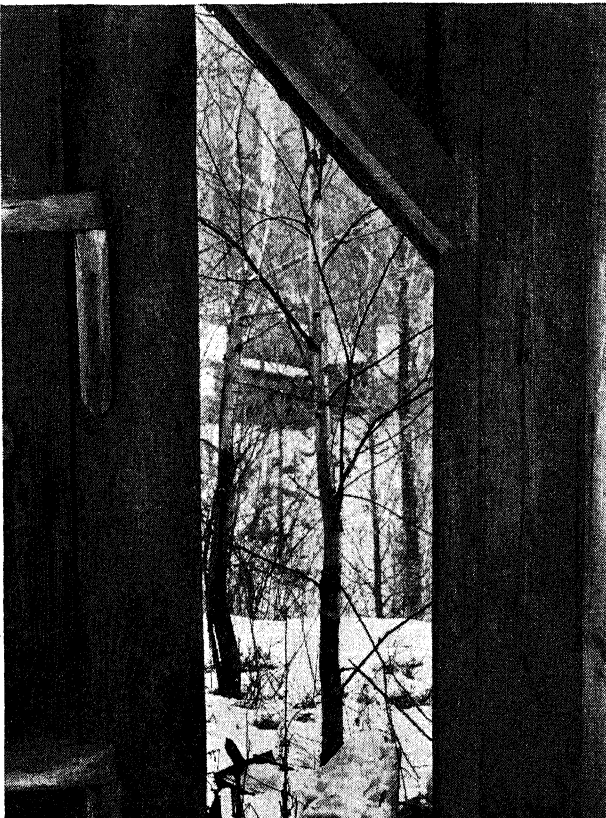
Starting about 1935, there was a definite trend toward the use of the larger miniature cameras which made $2\frac{1}{4} \times 2\frac{1}{4}$ negatives like the popular twin-lens Rolleiflex camera. In 1939, the $2\frac{1}{4} \times 3\frac{1}{4}$ Speed Graphic was placed on the market. This camera represented the largest of the miniature cameras and attained wide popularity. Two years later, the $2\frac{1}{4} \times 3\frac{1}{4}$ Kodak Medalist appeared. This camera used roll film, but was also adaptable for sheet film, film packs, and plates. It also included a military type coupled range finder and an excellent coated lens made by Kodak, known as the Ektar. Until about 1940, sale of the 35-mm. cameras exceeded the sale of the larger miniatures. From then on the proportion changed in favour of the larger miniatures.

Many of the 35-mm. miniature camera features, such as interchangeable lenses, coupled range finders and fast lenses began to appear on the large miniature cameras. This was one of the important reasons for the increased sales of the larger cameras. The production of fine-grained negatives because of the large film sizes was still another important factor. During the war period, the manufacture of miniature cameras for general amateur use was discontinued. During the first year after peace was declared there were no exports from Germany. The manufacturers in England and the United States were slow in producing cameras, although the demand for all types was tremendous.

Microphotography.—Microphotography is the process of copying documents or similar materials onto 16-mm. and 35-mm. films. Although other film materials could be used, the motion picture sizes continued to be preferred because of their convenience and speed in working. The resulting microfilm negative is too small to be read with the unaided eye, so readers or projectors were devised to make the enlargements for later use.

During the decade 1937–46, microphotography became a multi-million dollar business with tremendous demands placed upon it for many war purposes. Blueprint specifications were reproduced in quantity in order to have complete sets of plans available for the use of repair crews at advance bases. Vast quantities of field records were micro-filmed for preservation and for transfer to home offices in England and the United States. Captured documents were reproduced in order to provide copies for the Allied powers and permit detailed surveys of axis technical progress to be made. Under the direction of Henry Wallace, the department of commerce started the huge task of copying all the important industrial and scientific files in the

Examples of work by three outstanding photographers of the decade 1937–46. Top: Pius XII, then Cardinal Pacelli, at Montmartre, France in 1937; photo by Henri Cartier-Bresson. Bottom left: "Towards the Sugar House," Vermont, 1944, by Paul Strand. Bottom right: the Murray Hill hotel, New York city; a Berenice Abbott photograph



U.S. occupation territory for release to the public. Microfilm reports on the actual strips of film could be purchased, covering hundreds of different subjects of interest to the research laboratory and industrial plant.

One of the most interesting academic developments during 1944 was the announcement of the micro-card theory as applied to scholarly, scientific and academic microphotography. Fremont Rider outlined the micro-card system in his timely book, *The Scholar and the Future of the Research Library*. The micro-card envisaged the reproduction of from 100 to 500 pages of text, containing all or a substantial portion of a complete book, on the back of a conventional library card. The micro-card, would be filed in a library catalogue and the enquirer would remove the card and consult it on special reading equipment as though it were the original text. The theory gained in interest, and special equipment was made for this work, which included copying equipment and improved readers.

An interesting development in 1944 was the formation of Projected Books, Inc. This nonprofit organization had for its objective the development and application of a new method whereby patients in hospitals might read. A special power-driven microfilm projector was developed which projected a greatly enlarged image of a printed page on the ceiling of a hospital ward or on a special screen. The machine was noiseless in operation and the controls were arranged so that pressure by a finger, a toe or even an elbow would advance and retract a page on the reading screen. Tests clearly demonstrated the beneficial effects of this method of therapy for wounded soldiers, who might read educational or recreational material at will. Argus was making the machine while the film was being prepared by University Microfilms in Ann Arbor, Mich.

In England, special microfilming projects made records of important treasures and works of art in museums and libraries during the heavy bombing periods. The microfilm copies were then sent abroad for safe keeping. A spectacular use of microfilming occurred during the siege of Leningrad in 1941 when the new Shostakovich *Seventh Symphony* was copied and flown to New York city. The 252 pages of this symphony were copied on 100 feet of 35-mm. film and printed upon arrival. The music was presented at the N.B.C. studios under the direction of Arturo Toscanini. Other uses of microfilms included copying of the U.S. census records, of all numbers drawn in the United States selective service lotteries, of millions of official documents in government offices and of important drawings and machines interchanged between England and the United States.

V-Mail.—In April 1941 the British adopted the Airgraph system to solve the problem of getting mail to and from the forces in the near east. In 1942, the system was put into operation for the U.S. forces, scattered over the world, under the name of V-mail. The process was worked out by the Eastman Kodak company, originally with the object of using it for the rapid transit of mail by aircraft in peacetime. Arrangements were made for its operation with Pan American Airways and British Overseas Airways, and when war came the service was offered to the U.S. and British governments. The method employed was to write a letter on a special sheet of paper which was photographed on a 16-mm. film and flown in this form to its destination. There it was enlarged onto a sheet of paper, folded, sealed in an envelope and sent to the addressee. Eighty-five thousand letters, which would normally weigh about 2,000 lb., weighed only 20 lb., in film form. Millions

of letters were sent each week during the war by V-mail. This system of communication was finally discontinued on Oct. 26, 1945.

The postwar development of microphotography promised to become even more important as individuals, libraries, educational institutions, industrial plants, newspapers and others began to utilize this valuable means of research and preservation of records. Colour microfilm was being used for some projects. New legislation specified certain procedural changes and requirements intended to streamline the uses of microfilm. State legislation for the use of microphotography was extended by passage of special acts. The state of Illinois, for example, passed two separate acts legalizing the use of microphotography.

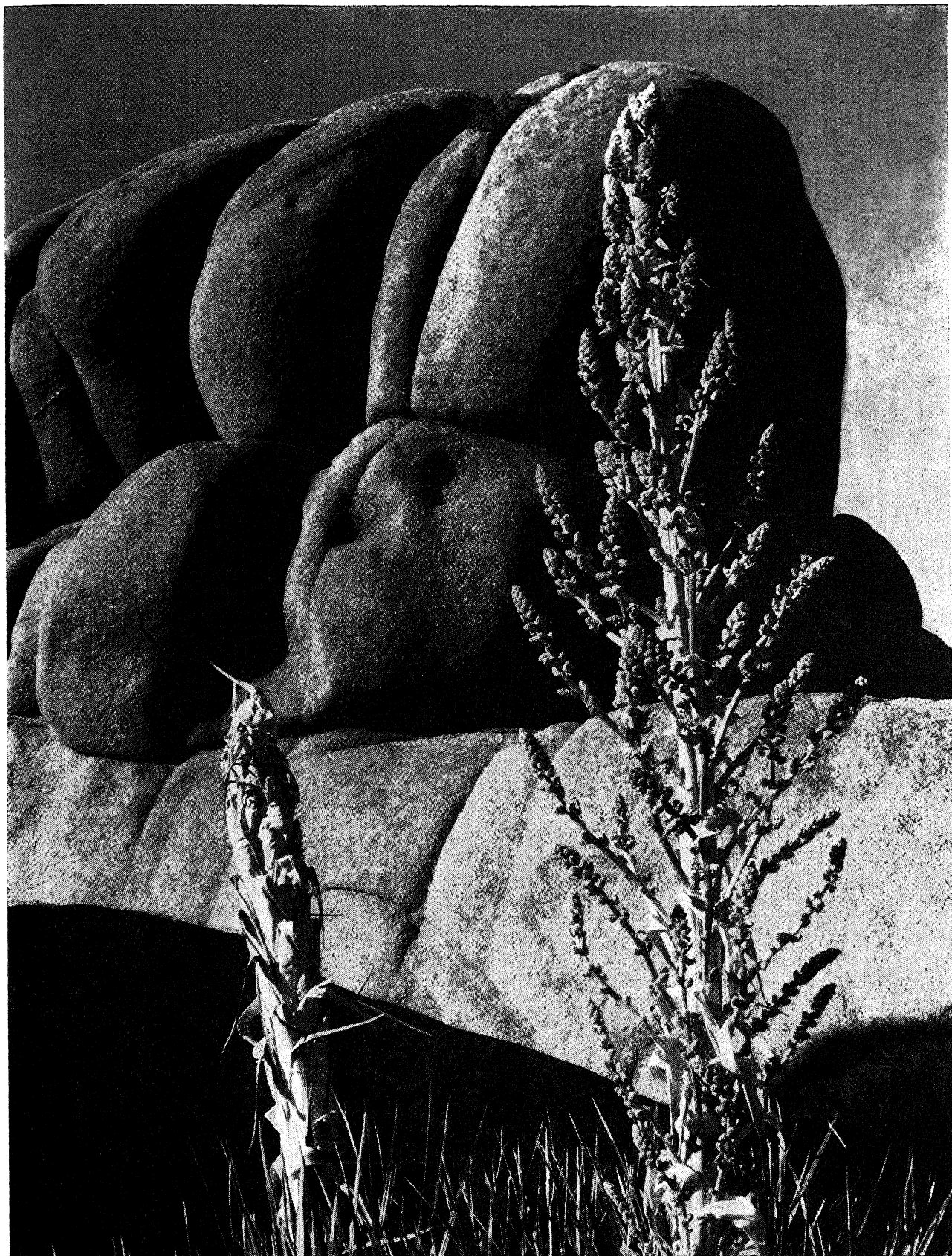
Applied Photography.—The discovery in 1926 that electron beams could be focused in the same way that light beams are focused with glass lenses led to the development of the electron microscope. By the time World War II started, electron microscopes had been manufactured and placed in a number of research centres in England and the United States. A similar development was also taking place in Germany. The electron microscope was capable of producing enlargements of minute objects up to 100,000 diameters in combination with the photographic negative.

One of the early surprises revealed by this microscope was that the developed silver grain in photographic emulsions actually was a tangled mass of thread-like material instead of a coke-like substance. Coarse filaments were produced with a typical hydroquinone developer, while Amidol and Metol made finer threads. During the following years, many original observations and discoveries resulted from electron microscope research. But because of military security these findings were not made public.

In the chemical field, the possibility of using the R.C.A. electron microscope as a high-precision electron diffraction camera added greatly to its utility. It was also used for surface observation, essential in metallurgy, in two different manners: (1) by the preparation of very thin plastic replicas of the surface to be studied, which were then examined in the standard instrument by transmission, and (2) by the development of a "scanning electron microscope" for the direct examination of surfaces. The latter combined the techniques of electron microscopy and electric picture transmission (facsimile) to obtain greatly magnified recorded images of surfaces.

An important wartime development was a method of photo tracing, developed by Kodak, for use in industrial plants to shorten the time required for making line drawings. This was known as the template or photolifting process in which line drawings were transferred to metal by photography and the metal then cut to make templates and parts for use in manufacturing. The procedure in this process was first to apply a stripping layer of sensitized emulsion or spraying with emulsion followed by direct printing from enlarged negatives. The drawings could also be made on metal sheets with fluorescent material which would glow after being exposed to X-rays or ultraviolet light. The Ansco company prepared a template process available for industrial use which was instrumental in saving many thousands of man-hours as well as a large part of production cost.

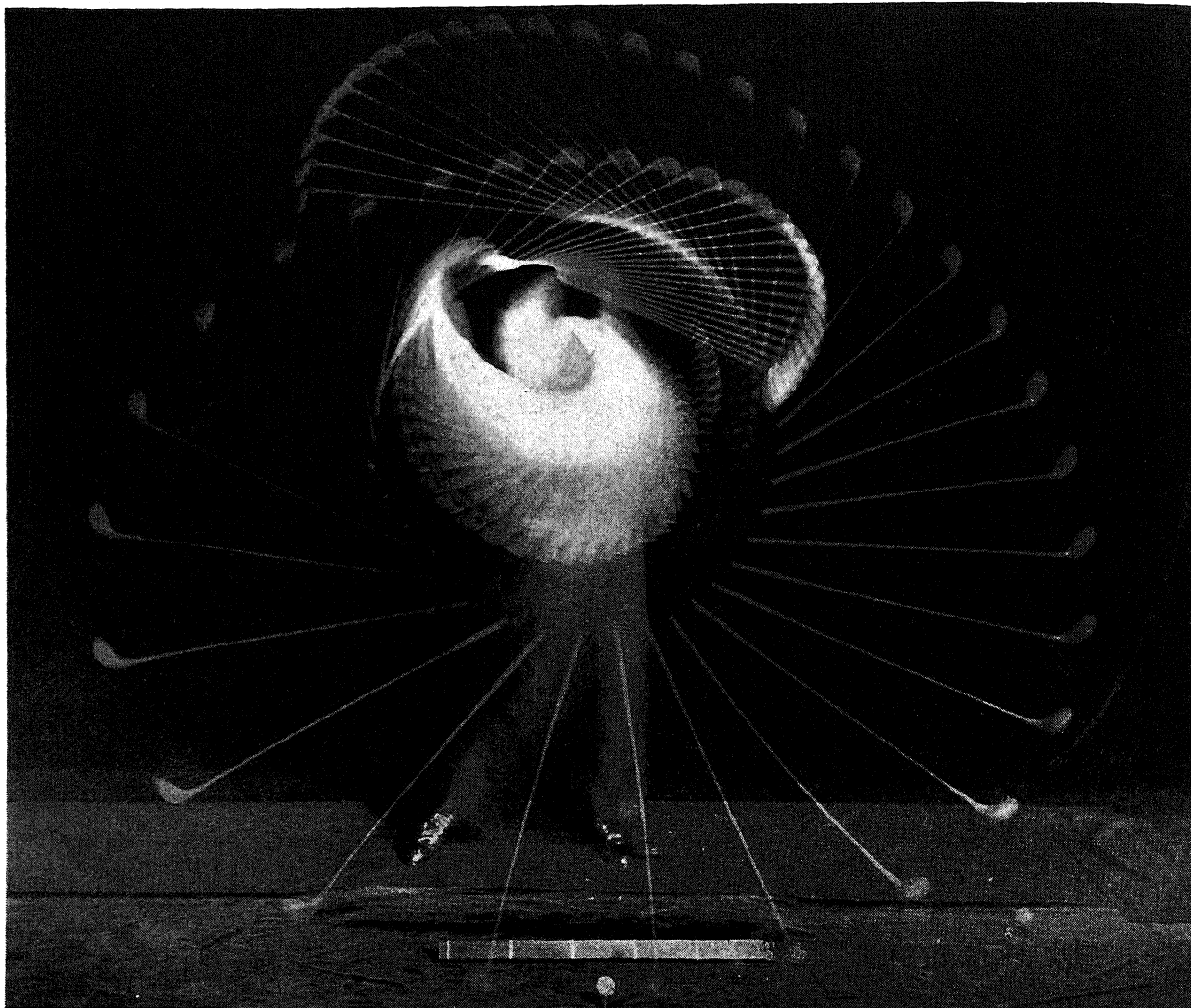
Westinghouse research engineers developed a cold-cathode X-ray tube which operated at a peak of 300,000 volts with currents ranging from 1,000 to 2,000 amp. during the discharge. In 1944 the use of this highspeed radiography was applied almost exclusively to ballistics research.



"Yucca, Mojave Desert," by Edward Weston, shown at a 1946 exhibit of his work at the Museum of Modern Art, New York city

The high-speed X-ray photographs showed that a high-explosive shell inflates to twice its normal diameter just before it bursts open inside armour plate and that the blast which accompanies the firing of a rifle bullet beats

the missile to the muzzle. Such pictures were exposed at $1/1,000,000$ sec. Ultra-speed X-raying was the only adequate method of determining how a bullet or shell behaves as it is projected down the bore of a gun and as it strikes the target. This same technique could also be applied to the study of the internal parts of rapidly mov-



Bobby Jones driving a golf ball, photographed by multiple-flash, a process first demonstrated by A. G. Spalding & Bros. on Dec. 7, 1938, which made possible successive exposures of $1/100,000$ sec. each, without blur. The exposure time was determined by controlled light flashes from a gas-filled tube

ing machines. A 2,000,000-volt X-ray tube was perfected by the Machlett laboratories. This new precision tube brought to the field of X-ray the same sort of improvement in definition that the electron microscope, compared to the standard microscope, brought to the field of optics.

In 1937, photographs were made which resulted in the discovery of infrared radiation in interstellar space. Also plates very sensitive to the extreme red were used in the investigation of stars normally invisible through nebular haze. Photographs made by Major A. W. Stevens from high altitudes during the 1937 solar eclipse gave evidence that the corona is globular in shape.

One of the valuable developments of the decade was a polarizing sheet material invented by Edwin H. Land and known as Polaroid. This polarizing material could be used to control the bright reflections when photographing objects and also to darken the sky in outdoor photography. It was also used in stereoscopic photography. (See below.)

During the summer of 1940 George L. Clarke of Harvard university and W. Maurice Ewing of Woods Hole Oceanographic institution collaborated in the making of important ocean bottom photographs with the aid of flash lamps. A small camera was lowered to a fixed distance above the ocean bottom, and good photographs were obtained at depths ranging from 125 ft. to nearly 3,000 ft. (See also CARTOGRAPHY; MOTION PICTURES; NEWSPAPERS

AND MAGAZINES; X-RAY.)

(W. D. Mn.)

Three-Dimensional Photography.—During the 1936-46 period, several brilliant inventions made it practical, for the first time, to show three-dimensional motion pictures in full colour to large audiences. In effect, these inventions converted the three-dimensional picture from an interesting toy into a valuable tool of art, science and industry.

In Jan. 1936 Edwin H. Land, inventor of Polaroid light-polarizing filters, made the first public showing of the three-dimensional motion pictures in full colour which he and his associates had been developing for several years. The pictures had depth. The people and objects in them appeared not only in their true height and width—the two dimensions of ordinary pictures—but in their true depth as well. They looked real. The people in the audience were tempted to reach out and touch them. The edges of the screen were like the frame of a window opening into space. Millions of people had seen still three-dimensional pictures—but always one person at a time, through a stereoscope. Now, the pictures were not only in motion, not only in full colour—but a whole group saw them, all at the same time.

In taking his pictures, Land had followed the practice

used by makers of still three-dimensional pictures for more than a century. He set up two cameras, side by side, with their lenses as far apart as the distance between the human eyes. He took two sets of pictures, or stereograms, of the scene at the same time. With two projectors arranged in the same way, he projected these stereograms on a screen, one over the other. But over each projector lens he placed one of the light-polarizing filters he had recently invented. After going through the filter, each picture was made up of light vibrating in one direction only. He turned the filters so that one picture's light vibrations were at right angles to the vibrations of the other picture.

Each member of the audience wore spectacles fitted with filters arranged in the same way. When the two pictures, mixed together in a confused jumble, came back from the screen to his eyes, each of his viewing filters stopped the light of one picture. His left eye saw only the picture intended for it; his right eye, only the right-eye picture. It was as if each member of the audience was present at the scene, picking up with his own two eyes the slightly dissimilar images that create the sensation of depth and solidity when they are fused together by the brain.

John Anderton, an Englishman, had suggested the polarized light scheme in 1891. But he had been unable to put it to practical use because there were no suitable polarizers. With his new polarizing filters, produced in great quantity and low in cost, Land had answered the question of how to show three-dimensional pictures to many people at once.

Soon after Land's demonstration, millions were looking at three-dimensional pictures through his polarizing viewers. By 1939, J. A. Norling had produced the first commercial three-dimensional colour movie (for Chrysler Motors) and was showing it at the New York world's fair. R. V. Brost and the brothers, C. and G. Lewis, were producing beautiful still pictures of the national parks, museum exhibits and industrial scenes. Hundreds of amateurs were making their own three-dimensional pictures and using the new scheme for showing them to their friends.

But Land and his associates were already working on an entirely new kind of three-dimensional picture. The double-projector scheme was effective, but it still called for two projectors and some careful adjustments. Moreover, all the pictures were projected; there was nothing corresponding to the paper print of ordinary photography. In 1940, before the Optical Society of America, Land presented a full answer to both problems. In 1938 the Czechoslovak experimenter, J. Mahler, had suggested to Land that a new kind of three-dimensional picture could be created if the individual images could be rendered in terms of percentage of polarization instead of in dyes or pigments. At Land's invitation, he joined the Polaroid research group. Land and Mahler then developed processes for making the pictures, called vectographs, not only in black and white but also in full colour. They put two polarizing films together, with their polarizing directions at right angles. They then set up varying degrees of polarizing power in each film, corresponding to the lights and darks of the two pictures. This composite polarizing picture looked and handled like an ordinary photograph, with blurred images. But when viewed through polarizing spectacles, it appeared as a perfect three-dimensional picture.

The vectograph was the first successful three-dimensional picture in the form of a single print. It was easy to view. It preserved all the detail of the original views. Most important, vectograph slides or motion picture film could be thrown on the screen through standard projectors with no

attachments whatever.

After 1938, much of the work in three-dimensional photography centred around applications of polarizing projectors and the vectograph. Two other developments, however, received attention.

In the United States, D. F. Winnek worked out a new process for making full-colour three-dimensional pictures of the parallax-grid type, originally invented by F. E. Ives. This type required no viewing device whatever. Winnek's pictures were transparencies, made with a special camera on film embossed with fine lenticules or ridges. They were coming into commercial use for portraits and technical subjects.

In the U.S.S.R. there were further reports of a new system, credited to S. P. Ivanov, for showing three-dimensional movies without requiring the audience to wear spectacles; reports described a screen of 2,000 finely cut and matched mirrors.

During World War II, all armies used three-dimensional pictures, taken from the air, to get most of their information about the enemy. At the war's end, the newly-invented Sonne continuous-strip camera was taking pictures, at 300 m.p.h., which showed the fingers and buttons of enemy sentries. Allied anti-aircraft machine gunners got most of their practice by firing three-dimensional images of tracer bullets against three-dimensional movies of attacking planes. U.S. troops studied aerial vectographs to get the lay of the land before they set foot in Normandy, Kiska, Leyte, Okinawa and other beachheads. Air gunners studied three-dimensional coloured drawings to memorize the cones of fire laid down by enemy aircraft. With three-dimensional pictures, gunners learned how to take apart and reassemble their automatic weapons; navigators mastered the complexities of celestial trigonometry; observers got acquainted with the look of enemy ships and planes.

During 1946, designers and manufacturers were busy applying the new techniques and inventions. Several plants started making vectograph prints and lantern slides. Amateur photographers in the United States were offered two new three-dimensional double-lens cameras, the "Stereo-Realist" and the "Tri-Vision." Engineers designed small, compact versions of the stereoscope, inexpensive and easy to use, notably the "Viewmaster" for showing 16 mm. and the "True-View" for 35 mm. still pictures. The "Stereo-Tach," an ingenious device for funneling two pictures through a single lens, was making it easy for amateurs to take and show three-dimensional pictures with ordinary cameras and projectors they already owned. Parisians were buying three-dimensional portraits that required no viewing device at all, apparently made by a process similar to Winnek's. Students learned the space-relations of solid and descriptive geometry from three-dimensional vectographic lantern slides prepared by J. T. Rule. The U.S. optical profession was prescribing courses in visual calisthenics, employing special sets of vectographs, for people with faulty vision. Manufacturers were showing their wares and scientists their experiments in three-dimensional pictures.

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J. P. Foley, D. F. Winnek and W. J. Tirrell, "Composite Stereography," *Journal of Experimental Psychology* (Sept. 1941). (R. T. K.)

Photographic Art.—Historically speaking, the two most significant events in the world of photography during the decade 1937–46 were the flowering of the "Documentarists" and the death of Alfred Stieglitz in 1946. The first opened new vistas of the application of photography to the problems of society, the last closed a noble life dedicated to the application of photography to the deeper needs of the human spirit.

The irresistible impetus of technological expansion during the decade was reflected in the mechanical, social and aesthetic advances of the art and craft of photography. No one could sensibly dispute the stature of the camera in relation to civilization and, specifically, to creative expression. In America, the enthusiasms of the Roosevelt reconstruction, the emphasis on both human and abstract values of expression, and the terrible tensions of World War II, joined to create both a tremendous industry and a mature visual language.

While the mechanical applications were accelerating, many interpretative and contemplative aspects were submerged. The frenetic promotion of "popular" photography, and the wild competitive scramble of the manufacturers to build markets on mass interest stressed obvious and superficial enticements. Few clear distinctions were made between representation and expression; an unfortunate emphasis on *subject* was evidenced in the photographic magazines, in advertisements and even in museum presentations. The pictorial salons, being the focal points of low-intensity expression, maintained the *status quo* of the conventionalist and the hobbyist. The few attempts to inject more serious and personalized work in the salons were feeble in numbers compared with the uncounted thousands of typical "pictorial" examples displayed and accepted by both amateurs and laymen as the type-standard of camera work. In fact, pictorial photography definitely deteriorated during the decade; the most obvious aspect of this deterioration lay in the emphasis on sterile themes and poor print-quality. This relaxation of standards infected commercial photography to the extent that increasing numbers of pseudo-photographic paintings were used by advertisers as obviously more effective than mediocre colour-photographs. Of course, the years of war depleted both photographic talent and materials; most of the younger men were in the armed forces, and the magnitude of industrial production did not favour consistent qualities of equipment and materials, to say nothing of their availability to the civilian. Technical standards in the armed forces were high; expressive standards low. Purely interpretative work suffered a serious decline: the years of war could well be defined as a period of *automatism and observation*.

Fortunately, there were some exceptions to this general statement; some of the war photography—military and press—was most impressive. In times of stress a sincere and intense expressive intention may emerge above the structure of necessity and convention. Significantly perhaps, the greatest operations, the most startling events, do not lend themselves to photographic expression. They are complete in themselves, and it is only by the merest chance that the event and its interpretative perception are coincidental. For example, the photographs of the atom bomb explosions, and the actual burning of London may be emotionally inferior to the organized and integrated

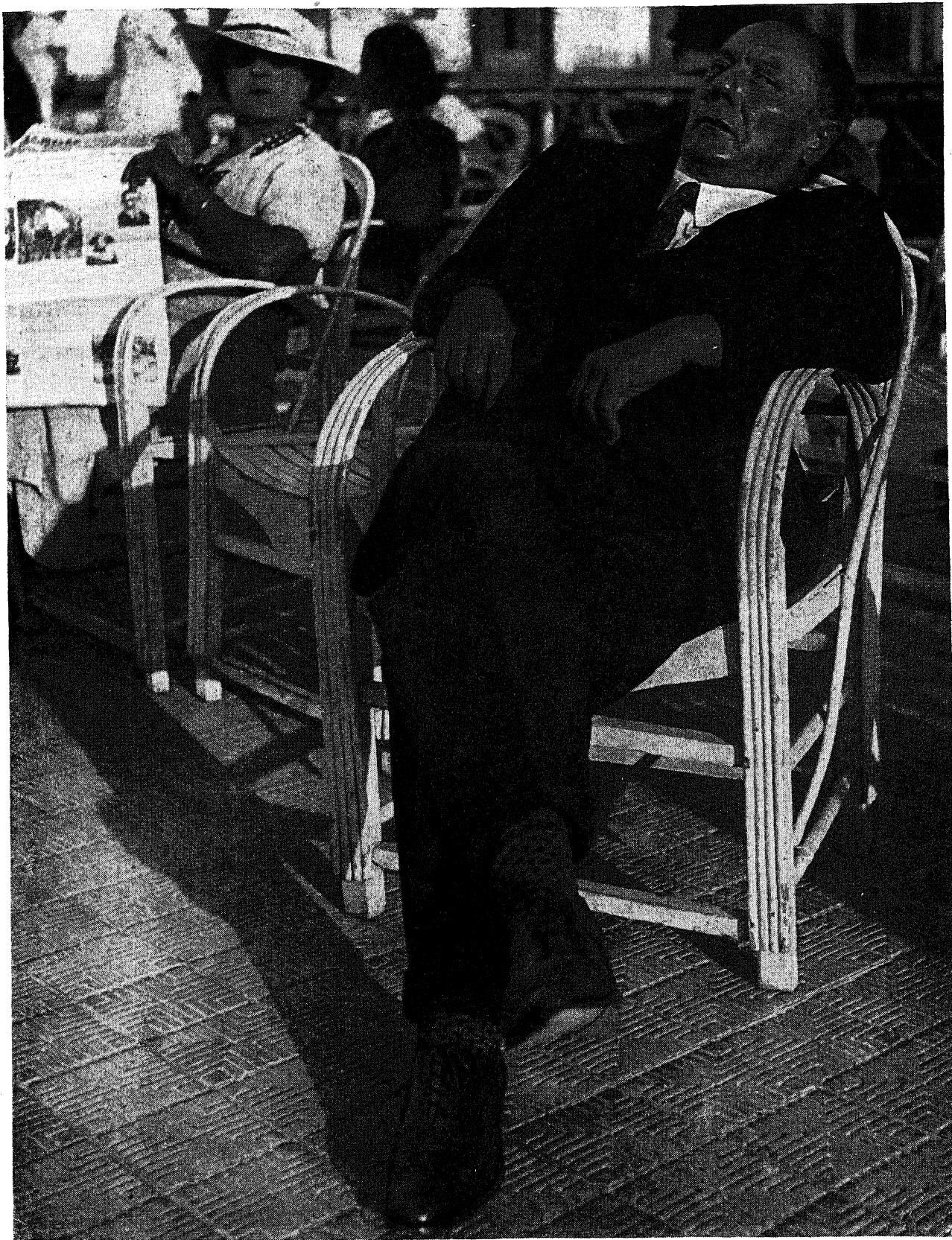
images of the shattered city, of a body prone upon a South Pacific landing beach, or a face of misery and starvation. The accidental exposure may be impressive because of the significance of the subject alone—not because of any possible integration by the artist. Photography has been, and probably always will be most effective in relation to the intimate and poignant aspects of the world, to simple things in their *considered* and *felt* moments of highest significance.

Nevertheless a few small but vital circles supported the clarification of aesthetic standards of photography during the decade, and encouraged appreciation of the more subtle objectives of the art. The department of photography of the Museum of Modern Art was established in 1940; for the first time since the Photo-Secessionists under Alfred Stieglitz, a vital, aggressive centre of creative photography commanded public attention and accomplished an important interpretation of functional and aesthetic standards. Under the able direction of Beaumont and Nancy Newhall, in the face of considerable opposition from reactionaries and super-*avant garde* documentarists, exhibits of great historical and creative importance were presented, ranging in time through David O. Hill, Mathew Brady and the American Frontier photographers, and Eugene Atget, to the comparatively recent exhibitions of Edward Weston and Paul Strand.

Retrospective exhibits—"Photography, 1839–1937" (organized and presented by Newhall prior to the formal establishment of the department), "Sixty Photographs," and the contest exhibition "Image of Freedom"—together with numerous contemporary documentary shows, proclaimed the catholic attitude of the department and revealed the constructive trends of photography. The Weston exhibit was probably the most compelling photographic presentation since the supremely significant presentations of Stieglitz at "291" and "An American Place." Weston's work was one of the majestic accomplishments in photography; with that of Hill and Stieglitz his work represented the climax of creative intensity and power. (Photography was recognized by the John Simon Guggenheim Memorial foundation in granting Edward Weston the first fellowship in photography. Within the decade eight others were honoured with fellowships).

A few other centres in America developed a serious interest in creative photography, expressed in exhibits and forums in museums and galleries. Some colleges added photography to their list of major studies. While many schools suddenly appeared to take advantage of the federal and state veteran's training programs, only a few truly creative and advanced institutions presented photography in full measure of dignity and effectiveness. Among those few may be mentioned the Institute of Design, Chicago, The New School of Social Research, The California School of Fine Arts, Black Mountain College, and a few small but worthy departments in other centres. Commercial photographic schools were legion; undoubtedly the most effective was the Art Center School, Los Angeles.

It is impossible to list here all those who worked creatively and constructively in photography during the decade. Without depreciating those not named, we may list Lisette Model for her incredible images of people; Dorothea Lange, who injected a moving mystical intensity into documentary work (all too frequently sterile from a creative viewpoint); Brett Weston, who revealed a powerful technique and a growing creative personality; Barbara Morgan, Berenice Abbott, Arthur Fellig ("Weegee"), Manuel Alvarez Bravo, Arnold Newman, Frederick Sommer, Eliot Porter, Dorothy Norman, Wright Morris, Cedric



Wright—to mention only a few in the domain of creative photography.

Paul Strand, whose retrospective exhibit at the Museum of Modern Art reaffirmed his position as one of the greatest U.S. photographers, and who worked extensively with

"Gambler Type, French Riviera," one of a series photographed by Lisette Model, also known for her pictures of New York's east side

the motion picture camera, undertook an interpretation of New England. Ansel Adams, following his exhibit in 1936 at An American Place, explored various fields of creative and functional photography, and was engaged in teaching

and lecturing and in the preparation of several books on photography. L. Moholy-Nagy, Man Ray, Andreas Feininger, Gjon Mili, and others were typical of those exploring new paths of photographic technique and application. Among commercial photographers (a term defining those working chiefly in advertising and illustrative fields), Edward Steichen, Anton Bruehl, Nickolas Muray, Will Connell, Tony Frissell were among those who carried these applications to an impressive perfection. In the fields of news and reportage, such names as Alfred Eisenstaedt, Margaret Bourke-White, Morris Engel, Frank Scherschel and many others of this hard-working, far-travelling clan made the camera the equal, if not the superior, of the written word as an instrument of information, record and

"Navajo Mother and Child," a representative print by Ansel Adams, well-known for his photographs of California and U.S. national parks

significant interpretation.

In any country where, as it was claimed for the United States, 20,000,000 people use a camera casually or otherwise, the high development of the art and craft may be assured, for out of this great mass of interested people will come a proportionally large number of creative and technically advanced photographers.

The trends and momentums of the ten-year period indicated the future developments of the art. For one thing, professional competition was certain to be increasingly severe. The full vitality of the profession could be assured only by the establishment of state boards such as those governing architecture, medicine and law. The photographer had to be aware of the world about him, well-rounded in aesthetics and the social sciences. The ten years suggested one positive and constructive fact, that the day of the casual professional was over. Photography was destined to grow as a universal device of communica-



tion and expression and the layman would demand of the professional the same perfection achieved in the higher levels of music, letters and architecture. It was hoped that the layman would be encouraged to enjoy photography both as spectator and creative amateur. While it would always contain aspects of a contemporary folk art and simple hobby, photography would undoubtedly assume a place of dignity among the humanities. The decade revealed the tremendous potential.

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Photon

See PHYSICS.

Physics

The most significant progress in the whole field of physics during the decade 1937–46 was in matters pertaining to nuclei rather than to atoms as a whole or to materials in bulk. The study of atomic nuclei was not, however, a subject isolated and distinct from other special branches of physics. The progress of the decade could almost be described as the culmination and co-ordination of the previous 40 years of advances in all branches of physics, ranging from the theoretical abstractions of relativity to the practical applications of the principles of electricity and magnetism leading to the development of new instruments and techniques. In the complexity of the science of those years, a new discovery in physics was of little value as an isolated item. Even to understand it, an acquaintance with the vocabulary, the background and the earlier history of physical discovery was essential. To be useful as a contribution to progress the new knowledge had to be assimilated with the old into a harmonious pattern.

The Fundamental Particles.—Physics deals with the properties of matter. It is necessary, therefore, to state what matter is composed of, even at the expense of brushing aside all difficulties connected with the meaning of the term. Every transformation which matter was known to undergo was explained in terms of some of the six fundamental particles listed in Table I, viz., the proton, the neutron, the electron, the photon, the meson and the neutrino. In many cases, the use of compound particles such as the deuteron and the alpha particle simplified verbal descriptions of these transformations. Had this list been prepared in 1937, the meson and the neutrino, being then hypothetical without the support of experimental evidence, would have been omitted. In the table, the duality of matter, confirmed by four decades of photoelectric experiments, and by remarkable demonstrations in 1943–44 of the diffraction of neutrons from a chain-reacting pile, has been recognized by classifying the photon as a particle. A typical stable atom, undergoing no transformation, consists of a tiny nucleus composed of protons and neutrons, surrounded by a cloud of negative electrons. It is only

during changes in the condition of an atom that the other three fundamental particles appear on the scene.

The Elements.—The number of chemical elements which could possibly exist used to be quoted as 92. These 92 elements were related in their properties, and presumably in their constitution, for they fitted very satisfactorily into the periodic table of the elements in much the same form as was originally proposed by Dmitri Ivanovich Mendelëff. Some of the 92 elements, indeed, like numbers 85 and 87, had never been isolated and identified beyond doubt, but so beautiful was the regularity in the periodic table that vacant places could be left for them, to be filled later, like seats in a theatre whose occupants have not yet arrived, but for which tickets have been sold. Even after the great discoveries of isotopes and of artificial radioactivity, the number of different possible patterns of chemical behaviour remained at 92, although it was recognized that narrow variations were possible in the structure of individual nuclei whose atoms exhibited identical chemical behaviour. By the end of 1938, some 600 reactions were known in which one kind of nucleus was transformed into another. Thus the nuclear alchemist had approximately that number of different atoms, some stable, but most radioactive, to classify under the 92 chemical behaviour patterns. The radioactivity of an atom does not, of course, affect its chemical behaviour.

Meanwhile, a powerful agent for the production of new nuclei had been made available by the discovery of the neutron by James Chadwick in 1932. It was found by Enrico Fermi and his colleagues in 1934 that very frequently a single neutron could be added to an existing nucleus of an atom to make a new atom of the same chemical species, which was usually unstable. In the cases in which this new nucleus decayed by emitting a negative electron, the final product was an atom whose place was one step farther in the direction of heavy elements than the original atom. For example, a neutron could be added to copper of mass 65 giving copper of mass 66. The latter was unstable, decaying by the emission of a negative electron to zinc of mass 66. Zinc is one step farther from hydrogen, the first element in the periodic table, than copper.

Physicists were thus faced with a momentous question. Could uranium, the heaviest element, be treated in the same way to produce elements heavier than any hitherto known? For a few years after 1937, occasional attempts were made to create new, heavy elements. The quantities of material which could be handled by techniques then known were minute, of the order of a few millionths of a pound. Partly for this reason, and partly on account of other complex phenomena, the interpretation of the results was subject to doubt, and there was some discussion as to whether true transuranic elements were actually produced. Indeed, although Emilio Segré stated in 1939 that “transuranic elements have not yet been observed,” most physicists took his remark to imply that the techniques of separating and identifying these elements had not reached the necessary perfection, but that there was no doubt, on theoretical grounds, that their existence would be demonstrated conclusively in due course.

Before the end of 1940, when scientific committees in several countries were studying the possibility of using nuclear energy for military purposes, two elements heavier than uranium were prepared at the University of California, and some of their properties were known. They were the 93rd and 94th elements. Part of this information was

Table I.—The Fundamental Particles

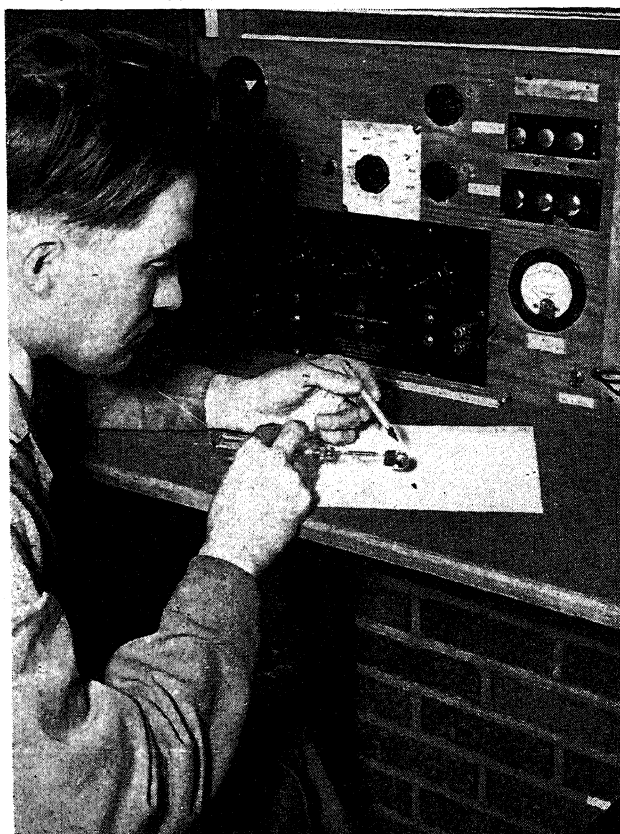
Particle	Charge e=electron's charge	Mass, at rest proton=1	Nature of Evidence
Proton	+e	1	Decisive
Neutron	0	1	Decisive
Electron	+e or -e	1/1840	Decisive
Photon	0	0	Decisive
Meson	+e or -e	1/10 or 1/40	Reliable
Neutrino	0	0?	Indirect
Deuteron	+e	2	photon+ neutron
Alpha Particle	+2e	4	2 protons + 2 neutrons

Table II.—The Periodic Table of Elements

Group	0	I	II	III	IV	V	VI	VII	VIII		
Period		Hydrogen 1 H 1.008									
1											
2	Helium 2 He 4.003	Lithium 3 Li 6.94	Beryllium 4 Be 9.02	Boron 5 B 10.82	Carbon 6 C 12.01	Nitrogen 7 N 14.008	Oxygen 8 O 16.0	Fluorine 9 F 19.0			
3	Neon 10 Ne 20.18	Sodium 11 Na 23.0	Magnesium 12 Mg 24.32	Aluminum 13 Al 26.97	Silicon 14 Si 28.06	Phosphorus 15 P 30.98	Sulphur 16 S 32.06	Chlorine 17 Cl 35.46			
4	Argon 18 A 39.94	Potassium 19 K 39.10	Calcium 20 Ca 40.08	Scandium 21 Sc 45.10	Titanium 22 Ti 47.90	Vanadium 23 V 50.95	Chromium 24 Cr 52.01	Manganese 25 Mn 54.93	Iron 26 Fe 55.85	Cobalt 27 Co 58.94	Nickel 28 Ni 58.69
4		Copper 29 Cu 63.57	Zinc 30 Zn 65.38	Gallium 31 Ga 69.72	Germanium 32 Ge 72.6	Arsenic 33 As 74.91	Selenium 34 Se 78.96	Bromine 35 Br 79.92			
5	Krypton 36 Kr 83.7	Rubidium 37 Rb 85.48	Strontium 38 Sr 87.63	Yttrium 39 Y 88.92	Zirconium 40 Zr 91.22	Columbium 41 Cb 92.91	Molybdenum 42 Mo 95.95	Mosurium 43 Ma ?	Ruthenium 44 Ru 101.7	Rhodium 45 Rh 102.92	Palladium 46 Pd 106.7
5		Silver 47 Ag 107.88	Cadmium 48 Cd 112.41	Indium 49 In 114.8	Tin 50 Sn 118.7	Antimony 51 Sb 121.76	Tellurium 52 Te 127.6	Iodine 53 I 126.9			
6	Xenon 54 Xe 131.3	Cesium 55 Cs 132.9	Barium 56 Ba 137.36	Rare Earths 57-71 (see below)	Hafnium 72 Hf 178.6	Tantalum 73 Ta 180.9	Tungsten 74 W 183.9	Rhenium 75 Re 186.3	Osmium 76 Os 190.2	Iridium 77 Ir 193.1	Platinum 78 Pt 195.23
6		Gold 79 Au 197.2	Mercury 80 Hg 200.6	Thallium 81 Tl 204.4	Lead 82 Pb 207.21	Bismuth 83 Bi 209	Polonium 84 Po ?	85 ?			
7	Radon 86 Rn 222	87 ?	Radium 88 Ra 226	Actinium 89 Ac 227	Thorium 90 Th 232.12	Protoactinium 91 Pa 231	Uranium 92 U 238.07	Neptunium 93 Np 239	Plutonium 94 Pu 239	Americium 95 Am 241	Curium 96 Cm 242
	Lanthanide Series of Rare Earths		Lanthanum 57 La 138.9	Cerium 58 Ce 140.1	Praseodymium 59 Pr 140.9	Neodymium 60 Nd 144.27	Illinium 61 Il ?	Samarium 62 Sm 150.43	Europium 63 Eu 152		
			Gadolinium 64 Gd 156.9	Terbium 65 Tb 159.2	Dysprosium 66 Dy 162.5	Holmium 67 Ho 163.5	Erbium 68 Er 167.7	Thulium 69 Tm 169.4	Ytterbium 70 Yb 173.0	Lutecium 71 Lu 175	

withheld, however, until the publication of *Atomic Energy for Military Purposes* by Henry D. Smyth in 1945. These two new elements were named neptunium and plutonium, after the remote planets. Their positions in a periodic table of the elements are given in Table II. After World

Unit of the mass spectrometer used in isolating the first sample of U-235, a radioactive derivative of uranium. Announcement of this work by Dr. A. O. C. Nier (examining the collection plates of the spectrometer) in Feb. 1940 was followed in the same month by the first appropriations in the U.S. for atomic research

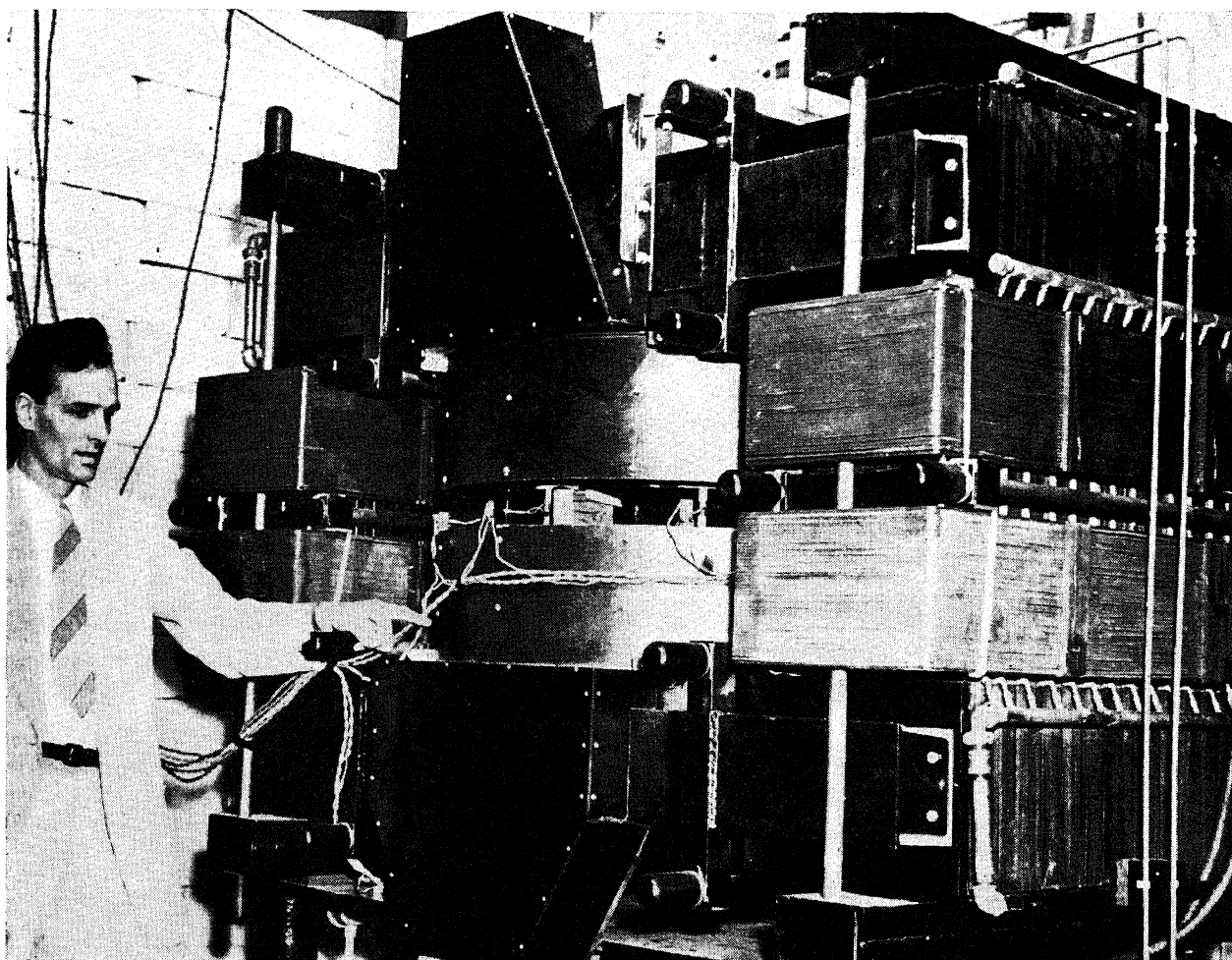


War II it became common knowledge that these elements were produced and separated chemically in considerable quantities during the development of the atomic bomb (*q.v.*). Later, in 1945, Glenn T. Seaborg at the University of Chicago Metallurgical laboratory announced the artificial manufacture and separation of the elements numbered 95 and 96, and demonstrated at the same time that they occurred naturally in minute quantities in certain radioactive ores. They were named americium and curium.

The special properties of transuranic elements were not yet published in 1946, but the four have been included in Table II in groups VII and VIII. For the reason just stated, however, it is not possible to adduce conclusive proof that they are in their correct positions. Some authorities believed that they formed part of a new series of rare earths, called the actinide series, beginning at actinium, number 89. Others regarded protoactinium, number 91, as the first member of this new rare earth group. If either of these points of view was correct, then the arrangement of the heaviest elements in Table II is in need of slight modification.

The four elements are radioactive. Plutonium has isotopes of mass 234, 235, 236, 237, 238 and 239. At least the 239 variety has a long half life.

Fission.—During the four years following the discovery of artificial radioactivity by Irene Curie and Frederick Joliot in 1934, several hundred different radioactive atoms were studied and classified. The majority of such radioactive atoms were formed by bombarding ordinary stable atoms with protons, neutrons, deuterons or other particles. A complete study of a particular process involved many experiments. It was important (1) to measure accurately the energy changes involved, (2) to find out how the yield of new nuclei or of small nuclear fragments varied as the energy of the impinging particles was changed, (3) to study the mode of decay of the artificially produced radioactive element, (4) to identify exactly the final products of reactions and (5) to determine the distribution of energy among the particles emitted during radioactive decay. In addition to providing a proper placing of these artificially radioactive atoms in the periodic table the investigations



The 70,000,000-volt synchrotron atom-smasher built for the U.S. navy in 1946. This machine was first proposed by Prof. V. Veksler, a Russian physicist, and also independently devised by Prof. E. M. McMillan of the University of California, Berkeley, Calif.

gave accurate relative measurements of their masses.

By the end of 1938 it was well established that most stable elements could be converted by some form of particle bombardment into radioactive elements of different chemical type, not more than one or two places removed from the position of the parent in the periodic table. In fact, a too ready acceptance of this process as the only one which could occur somewhat delayed the discovery of nuclear fission. The Germans, Otto Hahn and F. Strassmann, were the first to suspect that earlier interpretations of the disintegration of uranium under the impact of neutrons were at fault, for they proved that an isotope of barium was among the products. Almost immediately afterwards, early in 1939, Lise Meitner and O. R. Frisch in Copenhagen suggested that these experiments revealed a new type of disintegration, one in which the heavy nucleus formed by adding a neutron to uranium decayed by splitting into two approximately equal parts, instead of by emitting an alpha or beta particle in the established manner. From theoretical considerations they were able to give an estimate of the energy liberated per atom. The figure was staggering—200,000,000 electron volts. This is equivalent to saying that if the energy derived from one pound of fuel oil were sufficient to keep a diesel engine operating for one minute then the energy from one pound of uranium, if utilized by the process of fission, would keep the same engine operating for 2,000,000 or

3,000,000 minutes, that is, for five or six years. As events turned out, Meitner and Frisch's estimate was not far from the truth.

This process of fission, as it came to be called, occurred only while uranium was under the impact of a rain of neutrons supplied from a cyclotron or other outside source. But it was at once conjectured by Fermi and somewhat later proved by Leo Szilard and W. H. Zinn that during each fission process a few free neutrons were given out. Since it took only one neutron to initiate a fission, it was clear that, once started in a lump of uranium, the fission-decay process would be made self-perpetuating if at every stage more than one of the new neutrons could be made to initiate another fission.

To some practical scientists who understood these things, there was at once opened a vista of a future civilization based on a cheap and virtually inexhaustible supply of energy; to other scientists there appeared a possibility that the new nuclear energy might be used as an explosive. To the citizen of the world, however, the new knowledge did not come until nuclear energy was used in 1945 as a military weapon. In many people's minds the association of the release of nuclear energy with destruction obscured the possible benefits to be derived from it. A period of education was needed, in which physicists had to play their part, to assure the average individual that the advantages to be derived from the development of nuclear energy far outweigh the possible dangers of its use by an intelligent civilization.

As a result of the fission process, uranium atoms divide into two parts of comparable magnitudes, but not always

in the same way. All the elements in the range 35 (bromine) to 58 (cerium) have been found among the direct products except those numbered 37, 39, 41, 43, 45, 55 and 57. The fragments are all radioactive, decaying directly or by intermediate steps to stable elements. It was estimated that, on the average, 6.3 radioactive disintegrations follow each fission. Although fission can be accomplished by neutrons and by radiation, it is not a general property of elements, being confined to a few at the heavy end of the periodic table. Therefore it was not, to quote H. A. Bethe, a supremely important discovery from the point of view of pure science. It was not, for example, in the same category as the discovery of the neutron, or of the quantum theory of energy-exchange. Yet its practical importance and its impact upon civilization might be very far reaching. The development of atomic bombs (strictly, nuclear bombs, for all chemical bombs are atomic) was merely a technological advance, based upon the discoveries of physics, engineering and chemistry, for the previous half century. Comparatively few discoveries of fundamental scientific importance arose from the atomic bomb project. (See also ATOMIC BOMB.)

Cosmic Rays.—Years of painstaking and patient work on cosmic rays finally earned a magnificent dividend in 1938 by the discovery of the meson or mesotron, a new elementary particle. The cosmic ray particles which reach sea level were known to fall definitely into two classes, those absorbed rather easily by ten metres of water, and others which are much more penetrating. Practically all authorities agreed in identifying the soft component with high energy electrons. A suggestion that the penetrating component consisted of protons had to be abandoned after the tracks of the particles had been photographed and studied in cloud chambers. The curvatures of the tracks in strong magnetic fields and the density of the fog trails which they made could not be fitted into the proton hypothesis, nor did the tracks resemble any which were known to be due to electrons.

It thus became apparent that the penetrating component of cosmic rays included a kind of particle not previously recognized in physics. The first picture taken under conditions which permitted the recognition of the particle's peculiar properties was made by S. H. Neddermeyer and C. D. Anderson at the California Institute of Technology in 1938. This new particle, the meson, as it came to be called, was 180 times as massive as the electron or about one-tenth as massive as the proton. It was an unstable particle, decaying, as E. J. Williams and G. E. Roberts showed experimentally, two or three millionths of a second after its creation, into an electron and a neutrino. The meson was found to carry either a positive or negative charge equivalent to that of the electron.

It was a particle of great interest to theoretical as well as to experimental physicists. A nonscientific reader would have been surprised to learn that some time previous to 1938, the year of the meson's discovery, Hideki Yukawa's theoretical investigations of the structure of the nucleus at Kyoto Imperial university, Japan, led him to postulate a particle like the meson as necessarily existing. Let it be noted that Yukawa had no experimental evidence that mesons existed at the time of his theoretical work. According to his ideas, mesons were a kind of binder which kept the heavy particles in a nucleus in stable equilibrium.

Since mesons were known to have but a transient existence, and yet were found in the cosmic rays reaching the surface of the earth, they must have been created not

very far away. Observations from free balloons which sent down automatic radio signals were made at altitudes of more than 20 miles in the atmosphere. The results showed that the mesons of cosmic rays were created near the fringes of the earth's atmosphere. As they hurtled downwards at various speeds, most of them decayed to electrons and neutrinos, though some reached the earth's surface. The question of the nature of the agents which created the mesons in the high atmosphere was still under discussion. The agents were, of course, primary cosmic rays coming to the earth from outer space. Many investigators believed that these primary rays consisted largely of fast moving protons.

A climax of interest in mesons was reached in 1945 when they were produced artificially. X-rays from the 100,000,000 electron volt (Mev.) betatron of the General Electric company were found to cause mesons to be emitted from many atomic nuclei. Photons of energy less than 60 Mev. were ineffective. In the same series of experiments mesons of unexpectedly low mass were found. Since the masses of the mesons could not be measured accurately, but could only be estimated by indirect means, it was not yet certain whether these new particles had definite masses, like protons and neutrons, or whether they could be manufactured with almost any masses within a limited range. Mesons were not to be regarded as particles having an independent existence in a nucleus before their emission, whether by cosmic rays or by X-rays. They were perhaps thought of as being created by the nucleus at the moment of emission. A meson's mass and kinetic energy therefore represented, in a new form, some of the excess energy of which the unstable nucleus had to rid itself during its adjustment to a more permanent state of equilibrium.

Instruments.—*The Betatron.*—In a paper published in 1941 on the acceleration of electrons by magnetic induction, Donald W. Kerst described a new instrument, the betatron, by which electrons could be accelerated (in 1945) to 100 Mev. The previous limit, attainable by conventional methods, was about 5 Mev. To understand the principle of the betatron, it is necessary to remember that whenever the magnetic flux in a certain space is changing, an electromotive force is set up in a loop of wire surrounding the space. The electric force is present, indeed, whether the wire is there or not. In place of a loop of wire, Kerst set up a ring-shaped vacuum tube containing a source of electrons, between the pole pieces of an electromagnet. As the magnetic flux changed, electrons were accelerated in gradually contracting orbits, inside the ring-shaped tube, until they fell on a target. The magnetic field was not meant to be uniform at any particular instant. It had to vary radially in such a way as to keep the electrons bunched in a thin ring of current. The design of the magnet controlled the success or failure of the instrument. During one revolution each electron was accelerated by an amount equal to the instantaneous voltage generated in its orbit by the changing flux. The electron speeds were so high that 100,000 revolutions were possible in the short time, 0.0004 second, during which the flux was increasing. In the first model of the instrument, described in 1941, the electrons had an average gain of 20 or 30 volts per revolution, giving a total energy of 2.3 Mev. Two later models were built, one reaching 20 Mev., and the third attaining 100 Mev. It was with this last instrument that mesons (see under *Cosmic Rays*, above) were created in the laboratory for the first time in 1945.

Chain-Reaction Pile.—One of the first necessities of the Manhattan Engineer District, the organization responsible

for the technological development of the atomic bomb, was the discovery of a system fed by normal uranium in which the process of fission would be self-perpetuating. The system most likely to be successful was one in which uranium would be interspersed with a material called a moderator which would slow down neutrons but not absorb them. Carbon was the natural choice for a moderator by reason of cost, availability and purity. Fermi and Szilard showed that better results would probably be obtained if the uranium, instead of being uniformly mixed with the carbon, were disposed in lumps here and there in a definite lattice pattern. The success of such a pile constructed at the University of Chicago Metallurgical laboratory in 1942 was described by Smyth in *Atomic Energy for Military Purposes*. During the years 1942-45, larger piles of greater power were built, from which plutonium was extracted for use as an explosive. The first experimental pile at Chicago was initially operated at a power level of $\frac{1}{2}$ watt, later raised to 200 watts. The plutonium production piles apparently developed a power of the order of hundreds of thousands of kilowatts.

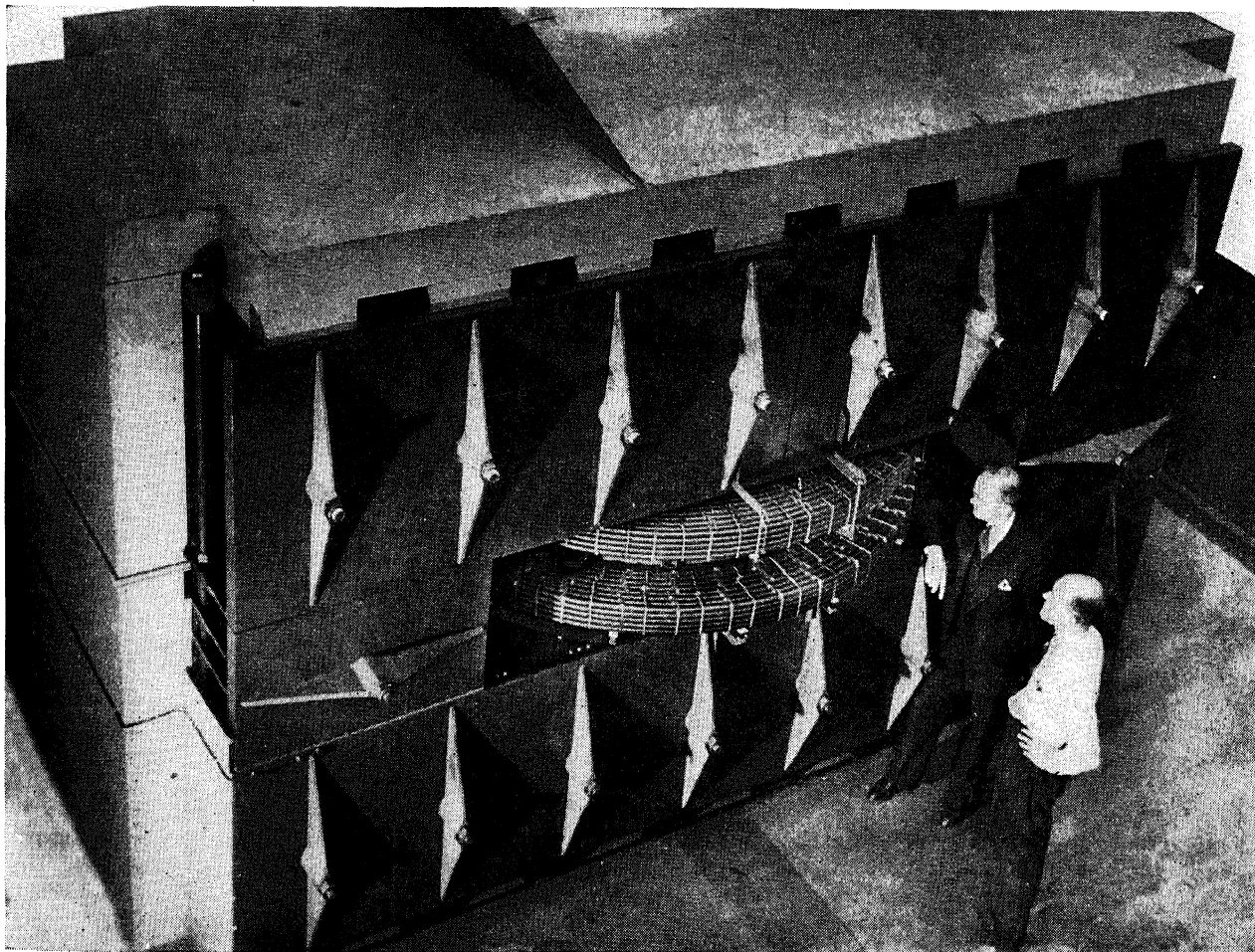
A chain reaction pile is radioactive to a degree undreamed of in scientific circles before World War II. It was therefore necessary that it be housed behind thick absorbing walls, usually many feet of concrete, to insure the safety of the operators and experimenters. As a scientific tool the pile became invaluable to nuclear physicists by reason of

its copious production of neutrons. The properties of neutrons could now be studied on an intensity scale which permitted the accurate measurement of effects which were formerly far beyond the range of experiment. For example, neutrons were reflected from crystals in the same fashion as X-rays; a whole new subject of neutron spectroscopy grew up under the secrecy of the Manhattan Engineer District, to be released in part for the information of the main body of scientists almost a year after the cessation of hostilities.

Furthermore, the chain reaction pile could be used to produce unusual isotopes in considerable quantity. Almost any material inserted for a time into the neutron atmosphere in a pile changes partially in its isotopic constitution. Uncommon isotopes are sometimes stable, sometimes radioactive. Both could be used as tracer elements to follow the course of inorganic and organic processes in animate and inanimate matter. The course of radioactive tracer elements could be followed by electrical means; the distribution of stable tracer elements was most conveniently discovered by routine analyses using a mass spectrograph. A new era of rapid discovery in biology and medicine was at hand.

Cyclotron.—It was only within the two preceding decades that physicists grew accustomed to using tools of research built on a large engineering scale rather than as small laboratory models. Electrostatic generators, betatrons, chain reaction piles and cyclotrons bore witness to this trend. A building 160 ft. in diameter was needed to house a University of California cyclotron. The magnet itself was

A betatron based on alternating magnetic forces, and accelerating electrons to energies of 100,000,000 electron volts, was constructed at the General Electric laboratories in Schenectady, N.Y., under the direction of Dr. E. E. Charlton (left) and W. F. Westendorp. Made public in Oct. 1945, the device was expected to increase applications of nuclear physics in medical and industrial research



52 ft. long and weighed between 3,000 and 4,000 tons. Such a structure could not be handled as one unit but had to be built up from steel plates. Even the pole pieces, each 15 ft. in diameter, were laminated. It was designed to produce deuterons of energies in the range 70–100 Mev.

The frequent nuclear disintegration phenomena observed in cloud chamber photographs of cosmic rays made investigators eager to produce in their laboratories charged ions with energies of the same order of magnitude as those possessed by cosmic ray particles. To achieve this end, Edwin M. McMillan proposed a new accelerator called a synchrotron which included some of the features of the cyclotron and some of the betatron. He noticed that because of the relativistic increase of mass with velocity, heavy particles being accelerated in a cyclotron gradually fell out of phase with the high frequency accelerating field between the dees. This condition compelled particles of definite energies, after they had circled many times, to stay in equilibrium orbits from which they could not be removed by the normal operation of the cyclotron. All that was necessary to accelerate this group of particles to much higher energies was to change the main magnetic field or to vary continuously the frequency of the accelerating voltage between the dees. For ions like deuterons or alpha particles the frequency changing device was the more appropriate. McMillan believed that there was a possibility of reaching energies in the 1,000,000,000-volt range. The synchrotron could not, of course, provide a steady current of ions, but only a succession of strong pulses.

Electron Microscope.—There is in optics an inviolable rule that a microscope cannot show any detail which is of smaller dimensions than about one wavelength of the light by which the detail is examined. The useful magnification of an optical microscope is therefore limited to about 2,000. X-rays, although they have wave lengths several thousand times shorter than visible light, cannot be used because no convenient ways are known of refracting and focussing them to make recognizable images. The wave lengths of moving electrons, however, are comparable to common X-ray wave lengths when the electrons have energies greater than a few hundred electron volts. Theoretically, then, electrons can be used in place of ordinary light in the operation of a microscope and a resolving power should be attainable far in excess of that of an optical microscope. After a few years of development, the electron microscope emerged from the state of being a scientific curiosity into being a powerful tool with immediate applications in nearly all phases of physical and biological science. In such a microscope the image was produced by a beam of electrons which passed through the specimen just as light passes through an ordinary microscope slide. The specimen had to be very thin. The thicker parts of it deflected more electrons from the beam than the thinner parts. Carefully designed coils carrying steady currents then acted as lenses for the beam (which carried the pattern of the specimen) and focussed the beam into an enlarged image on a photographic plate. So close was the analogy between the behaviour of light and of electrons that much of the optical theory required little modification to make it fit the electrical case. Similar instruments using electrostatic in place of electromagnetic lenses were also constructed.

An important advance in electron microscope technique was made in 1944 by Robley C. Williams and Ralph W. G. Wyckoff. The former, an astronomer, was well aware of the technique of estimating the heights of mountains on the moon from the obliquity of the incident sunlight and

the length of the resulting shadows. Shadows were therefore intentionally cast on specimens prepared for the electron microscope not by light, but by evaporated metal atoms. The parts coated with metal were stronger absorbers and deflectors of electrons than the uncoated or shadow parts. Photographs reproduced this contrast in such a way as to give the impression of true optical shadows. With this technique it became possible to estimate the sizes of objects about one-ten-millionth of an inch in diameter—in the range of the dimensions of molecules. Large molecules and some of their structural features were seen for the first time.

Klystron and Magnetron.—Although the general properties of electromagnetic radiation in the frequency range between radio and the infra-red were well known before, it was not until 1938 that an efficient generator of such radiation was devised. In that year a description of the klystron oscillator was published by W. W. Hansen. In his klystron oscillator a beam of electrons was sent through a pair of grids between which a small oscillating field was maintained. The emergent beam therefore consisted essentially of a fluctuating electron current. When this particular electron beam was sent through another pair of grids, a considerable fraction of the power originally supplied could be withdrawn in the form of high frequency radiation, with a frequency of the order of 500 megacycles per second. The efficiency was remarkably high, in the neighbourhood of 40%. The invention of such an efficient source of high frequency radiation made radar an instrument of practical application in navigation and war.

Even radar installations using frequencies of the order of 500 megacycles were somewhat bulky, since the dimensions of the apparatus had to be several radiated wave lengths. For equipment to be used on small craft and aeroplanes shorter wave lengths still were needed. A device for generating satisfactory amounts of power in the microwave region was developed in England at the University of Birmingham (by M. L. Oliphant, it is said) in 1940. This was the cavity magnetron, an efficient generator up to frequencies of the order of 9,000 megacycles (3 cm. waves). The basic principle of its operation was simple. Everyone knows that when air is blown across the mouth of an empty bottle a considerable sound is emitted, its frequency being controlled by the size of the bottle or cavity. Similarly, when electric charges (*i.e.*, electrons) were sent, in a vacuum, very quickly across a small slit leading to a metallic cavity, electromagnetic oscillations characteristic of the size of the cavity were set up. The magnetic field by which the moving electrons were controlled gave rise to the name magnetron. Magnetrons, indeed, had been used as experimental laboratory devices for some years previously; magnetrons with resonant cavities changed the pattern of warfare by reducing the bulkiness of radar equipment. Cavity magnetrons were capable of producing higher frequency oscillations than klystrons. Therefore they used correspondingly smaller antennas. The cavity magnetron was built to give a peak output for a few millionths of a second up to 1,500 kilowatts. As scientific instruments both represented improvements over previous devices to the same extent as a searchlight outshines a pocket flashlight. (See also RADAR.)

Mass Spectrograph.—The use of uncommon isotopes as tracer elements to follow the courses of chemical reactions in complex systems like plants and animals was formerly restricted to radioactive isotopes whose presence was detected by their radiations, and to heavy hydrogen which, in sufficient concentration, could be estimated by density determinations. By 1944 the mass spectrograph was developed

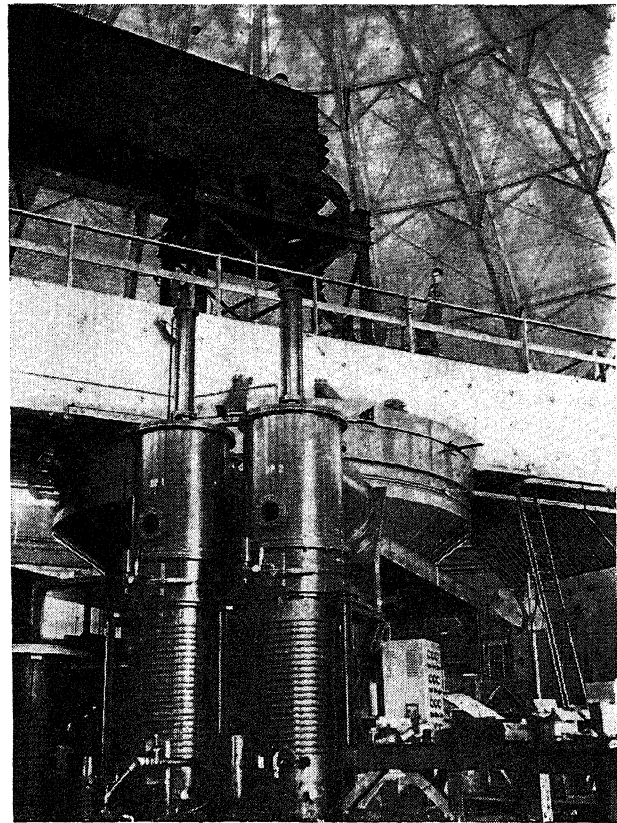
in such a way that it could be used for routine analyses, each run occupying much less than an hour. Consequently, rare isotopes like carbon 13 which is not radioactive could be used as tracers. Carbon in convenient form containing a known proportion of carbon 13 was introduced into a system perhaps in the form of food. At any subsequent time its distribution could be determined by converting any small chosen part of the system to carbon dioxide which was fed into the mass spectrograph. The instrument recorded the proportions of the various carbon isotopes which were present. The migration of the original carbon introduced into the system could thus be followed easily. Damage to delicate organisms which might be caused by radioactive tracers was avoided.

Physics and World War II.—Since World War II was a physicists' war in the same sense that World War I was a chemists', all the major belligerent powers mobilized their scientific manpower and resources to some extent for military purposes. Curiosity regarding the enemy's progress in scientific warfare could be satisfied only by the frequency of appearance of new and effective weapons and by reports of the intelligence services. The extent to which science was organized for warfare in different countries naturally depended on the national point of view regarding science. Since no two nations looked at this matter in the same light, the attitudes adopted by a few of the major powers are described separately.

Germany.—Quoting from a statement by S. A. Goudsmit, the course of German science during the years 1937-46 can be said to have been determined by three factors. First, the esteem for bona fide science and scientists declined rapidly during the nazi regime, while men of inferior ability, presumably good party men, rose in power. Second, the German government expected the war to be won in a short time and initially did not mobilize science for the war effort. Third, the broad fundamental training of German engineers eliminated to some extent the need for academic scientists' participation in wartime applied science. At the start of the war scientists within the age limits set for military service were called to the colours. There was at first little co-ordination among the competent research staffs of the various branches of the armed forces and important industries. The industrial laboratories were the least dominated by the nazi influence and were occasionally able to employ scientists who would have been barred from government laboratories. It was mainly from the industrial laboratories and from government sponsored laboratories that the major scientific accomplishments came. In heavy rocket-propelled devices, Germany was ahead of the rest of the world.

Two groups, one under Werner Heisenberg, at the Kaiser Wilhelm Institute for Physics, the other under Erich Schumann at the Army Ordnance Research department, made a serious attack on the problem of releasing nuclear energy from uranium. Although hampered by lack of co-ordination among different laboratories, by interference from high government officials, and by a lack of co-operation among administrative (as distinct from scientific) leaders, the German scientists believed that they were ahead of the United Nations in the uranium problem. That belief continued after the capitulation of Germany, and was shattered only when news reached Europe of the explosion of an atomic bomb over Hiroshima.

Great Britain and Canada.—Great Britain had for many years maintained a government-supported department of scientific and industrial research, whose function had been to encourage fundamental research and its important developments by subsidizing scientists ranging from graduate



Cyclotron at the University of California at Berkeley, as it neared completion in 1946. Work on the machine was begun in 1940 and interrupted by the war

students to directors of laboratories. A natural basis for co-operation was therefore at hand to link the efforts of academic and industrial scientists and engineers. At first it was necessary to put the major effort on devices of defense, particularly against aircraft and submarines, but after two or three years of warfare the emphasis was shifted in the direction of offensive devices. Before the end of the war, in the face of the German robot bombs, a partial reverse shift appeared to be necessary.

The groundwork for mutually beneficial co-operation between Great Britain, Canada and the United States was already laid before the United States took an active part in hostilities. Microwave radar centring round a British invention was developed primarily in the U.S. Many British scientists joined the Canadian group near Montreal to work in collaboration with the Manhattan Engineer District on the development of the nuclear bomb. Much secret information was exchanged to the advantage of the three participating countries, for many of the difficulties met and overcome by one country were later encountered by another.

Japan.—Only occasional items were printed concerning science in Japan during the war years. The sums allocated for scientific research with the object of developing new weapons were pitifully meagre by western standards. Apparently it was quicker and more feasible to train men in suicide tactics with existing weapons, both in the air and under water, than to develop new ones. In radar the Japanese lagged far behind the United Nations; there was no very serious work on the uranium problem although there were men with the ability to direct it. It was reported that when the first atomic bomb was released, a communication was dropped and retrieved by the Japanese military authorities which suggested the names of one or more physi-

cists who would, by their previous training and world-wide prestige, be in a position to estimate with some accuracy the general features of the new bomb. Later, according to the story, it was discovered that the scientists concerned had not been contacted, or were not given the information until after the occupation of Japan by the U.S. army. If the report was based on fact, one of two conclusions can be drawn; either the country was in a state so disorganized that the military authorities could not get in touch with leading scientists, or else the prestige of Japanese physicists in the eyes of the military leaders was not as great as in the eyes of scientists of other nationalities. Japan had several internationally known schools of physics research before 1941. They suffered a temporary setback by the regrettable destruction by the U.S. army in 1945 of a cyclotron, an instrument devoted entirely to fundamental research.

U.S.S.R.—Peter Kapitza, probably the foremost Russian physicist and certainly the best known in foreign countries, gave a report in 1943 which may be taken to describe the official attitude of his country toward fundamental research, and outlined desirable goals and types of organization. He felt definitely that the organizational forms of scientific work accepted in the west could not be applied unchanged in the U.S.S.R., principally because of the socialist nature of the country. The rather accidental and spontaneous character of science in Anglo-Saxon countries was out of place in the soviet union, where a more purposeful guidance was necessary. He said he believed that the function of the Academy of Sciences was to direct through its institutes all fundamental science in the U.S.S.R., ideologically, from top to bottom, along a sound channel. Kapitza emphasized that a scientific leader must not be a man who spends most of his time at a desk engaged in administrative work, but one who is constantly in the laboratory, actively participating in the work of research; and that to use the time of highly trained personnel to the best advantage it was necessary to provide them with adequate though less highly trained assistants. How well this policy was borne out in practice may be judged from a report that in the science institutes of the U.S.S.R. only 25% of the personnel were highly trained scientists.

In spite of, or perhaps because of, the responsibility assumed by the Academy of Sciences in guiding fundamental research, it appeared to British visitors to Russian laboratories that the physical problems engaging the attention of investigators there were just those which were of greatest current interest to able scientists all over the world. Nuclear research and the physics of solids occupied a prominent place. The beginnings of Kapitza's own special field of research, that of magnetic effects at extremely low temperatures, were laid while he worked in Lord Ernest Rutherford's laboratory in England. In theoretical physics the work of J. E. Frenkel influenced many branches of research, including that on crystals under the direction of Abraham F. Joffé.

United States.—With the example before them of the useful contribution which British physicists made to military science, Americans were unusually well prepared for a co-operative war effort which would include the mobilization of scientists. This was done on a voluntary basis, through the Office of Scientific Research and Development, headed by Vannevar Bush. Gradually the co-ordination between the groups working under this title and the military authorities improved until it was smoother and much more effective than in Germany and Japan, and at least as pro-

ductive as in the U.S.S.R. and in Great Britain. In an analysis of the operations of the Office of Scientific Research and Development, published under the title "The Great Science Debate" in *Fortune*, June 1946, three points were emphasized:

(1) It became clear very soon that there were grave deficiencies not only in the military and industrial research of the U.S., but also in the fundamental research of the country. That these deficiencies were made good in time to contribute to the ultimate victory of the United Nations was due to a combination of lavish expenditure of funds and of heroic efforts. (2) The major wartime achievements were in applied physics, although some discoveries of fundamental importance emerged as side-issues. (3) Almost any problem could be solved if enough effort was directed towards it, with the result that the difficulty of the future was diagnosed as one of knowing which are the most important problems to be solved, rather than of knowing how to solve particular problems. Urgent work was pushed to completion because of the versatility of men trained in fundamental science. Biologists became physicists, chemists became engineers, and physicists turned their hands and heads to research in a dozen different fields. Like a skillful artisan who could quickly learn a new trade, a competent research worker was soon at home in a new profession. This intermingling of specialties contributed notably to the successful co-operation which characterized the U.S. scientific war effort.

As I. I. Rabi, 1944 Nobel prize winner in physics, put it, physicists were placed in an embarrassing position by the very success of their efforts in the war. The embarrassment arose from the fact that during the war years, the progress of physics was less than moderate, while technology advanced by leaps and bounds. The inheritance of technology was, in a few years, exploited to the point where further substantial progress could come only from further advances in physics.

The country's greatest mistake, not made in most other countries, was the enrolment in the armed forces of young potential scientists. The U.S. was faced for nearly a decade with an acute shortage of trained scientific personnel. (See also CHEMISTRY.)

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Physiology

Perhaps the most fundamental trend revealed by a study of the progress in physiological science during the decade 1937–46 was the interrelationship and interdependence of all the sciences, physical, biological and social. Techniques, materials and concepts developed in one branch of science find unsuspected usefulness when applied to another apparently unrelated branch.

Physiological Psychology.—In a series of noteworthy experiments C. P. Richter demonstrated that rats manifest specific "hungers" for substances of which they are in need. He found that after removal of the adrenal gland, sodium passed out into the urine in excessively large amounts, thus producing profound changes in the body chemistry which result in grave symptoms and finally death. However, when given access to sodium chloride, adrenalectomized animals ingested sufficiently large amounts to keep themselves alive and free from symptoms of insufficiency. Transection of the nerves subserving the taste sensation resulted in loss of this self-regulatory ability, indicating that the selection of

salt was not merely on the basis of trial and error with subsequent learning that salt alleviated the symptoms. Furthermore, rats which were adrenalectomized were able to detect salt solutions of very low concentration which normal rats could not distinguish from water.

Very instructive experiments were conducted by R. T. Bellows on the water drinking habits of dogs with fistulas of the oesophagus which prevented the ingested water from reaching the stomach. These studies revealed that when such an animal had been deprived of water for a certain number of hours and had thus established a certain water deficit, it would drink an amount of water roughly proportional to the degree of the deficit. This indicated that entry of water into the stomach and subsequent absorption was not necessary in gauging the amount of water needed by the animal.

Such studies as the two mentioned above revealed that many of the concepts formerly held concerning the physiological basis for basic aspects of behaviour such as food-getting and sex behaviour were narrow and inadequate. The co-operation of the physiologist and the psychologist promised to establish a true science of the biological bases of behaviour.

Application of Physics to Physiology.—The revolutionary advances in physics during the decade provided many important materials and methods for use in physiological research. The production of isotopes of elements found immediate and extensive application in the study of physiological processes. These isotopes represented a form of chemical elements which reacted just as the corresponding natural elements did in the animal body, but which possessed the unique advantage that they could be detected and measured at any stage in their progress through the organism. This detection was possible by reason of the fact that the isotopes, although chemically and therefore physiologically identical with the naturally occurring elements, had different atomic weights and, in some instances, possessed radioactivity. Thus, by either measuring the atomic weight of the element in question or by detecting the radioactive emanations, the location and concentration in the body tissues and fluids of the organism could be determined. Many studies of this type were performed; the results of only a few can be related here.

Perhaps the most significant conclusion to be drawn from these studies is that most of the tissues of the body are constantly participating in chemical exchanges even under conditions in which their average composition remains constant. For example, when isotopically "labelled" fat is fed to a normal animal, it becomes thoroughly intermingled with the fat already stored in the body to the extent that many of the fatty acids of the fed fat replace the fatty acids in the molecules of stored fat, even though the total amount of fat in the body and its average chemical composition did not change. Similar relationships exist for other foodstuffs and minerals.

The chemical reactions which various foods and chemicals undergo in the body can be studied to advantage by means of isotopic "tracers." Thus, it was demonstrated that carbon dioxide, formerly considered to be only an end product of oxidation in the body, can be utilized in the synthesis of certain body constituents.

The fact that certain elements show a great affinity for one specific tissue in the body offers a means of producing highly concentrated intracellular radiation effects when the element in question is administered in radioactive form. Advantage was taken of this principle in the treatment of hyperthyroidism with a radioactive isotope of iodine. Most of the administered iodine is taken up by the cells of the

thyroid gland, and the radioactive emanations depress the secretory activity of these gland cells which have been producing an excessive amount of their product.

Much new knowledge regarding the biological effects of radiant energy was gained during the decade. The effects of exposure of living organisms to all the new types of radiation encountered in connection with nuclear reactions of atoms were intensively studied. The possibility of applying the neutron rays generated by the cyclotron to the treatment of cancer received encouraging support.

The most important form of biologically active radiant energy to which most persons are exposed is the ultraviolet radiation in sunlight. Certain chemical substances known to be present in all living cells show a high capacity to absorb ultraviolet light, and it is upon these cell constituents that the primary effects are exerted. Ultra-violet light was found to produce a variety of effects on living organisms, depending upon the susceptibility of the organism to the intensity, duration and frequency of exposure. Increase in the frequency with which hereditary genetic mutations occur was shown to be a prominent effect of ultra-violet irradiation. It was shown that in general the effect of ultra-violet radiation on living cells is destructive, but when the degree of injury is slight, stimulation of the activity of the cells may result from the liberation of stimulatory substances from the injured cells. Evidence converged from a number of sources to indict the ultra-violet radiation of sunlight as a major factor in human cutaneous cancer. Experimentally, cutaneous cancer was consistently observed in animals exposed to adequate amounts of ultra-violet radiation.

Physiology of Nerve and Muscle.—The application of electrical methods to the study of nerve and muscle continued to yield valuable information. Although the controversy concerning whether nervous impulses are transmitted by electrical impulses or by chemical substances was not completely resolved, a clearer picture of the interrelationship between these two types of phenomena evolved.

The electrical activity of the brain was widely investigated, and studies of "brain waves" or electroencephalograms showed that persons with certain diseases such as epilepsy and traumatic brain injury had abnormal patterns.

It was shown that the anterior horn cells or motor neurons of the spinal cord do not send out impulses unless they are activated by the stimulus of arriving nerve impulses. In the central nervous system it was demonstrated that the central excitatory state or the increased sensitivity of a nerve cell which follows a previous stimulation was a dynamic phenomenon caused by persistence of the impulse passing through local nerve cells.

Much study was devoted to the substances which are released at the ends of nerves and which influence the next nerve cell or gland or muscle to which the nerve leads. It was demonstrated that acetylcholine is released not only at parasympathetic nerve endings but also at nerve endings in the central nervous system, at the junction, or synapse, connecting one relay with the next and even at the termination of nerve fibres on skeletal muscle cells. An enzyme cholinesterase, capable of splitting and inactivating the acetylcholine, was found present in high concentration in all these locations where acetylcholine is set free, and the rapid destruction of the acetylcholine by cholinesterase accounts for the short duration of the effect of a single nerve impulse.

The exact physiological alterations that skeletal muscle

undergoes when it is deprived of its nerve supply were investigated by many researchers. It was discovered that denervated muscle when properly stimulated electrically could be made to undergo a true tetanic contraction similar in every respect to that of normal muscle. It was conclusively proved that stimulation of this type during denervation prevented to a large degree the atrophy which usually occurs in muscle separated from its nervous supply. This principle was applied to the treatment of patients with various types of nerve lesions.

Respiration.—Because of the importance of respiration in aviation physiology, this field commanded a great deal of attention during World War II. Exact data on oxygen consumption, respiratory volume, the exchange of gases between the blood and the air in the alveoli of the lungs, the rate of blood flow through the lungs, and the concentration of various gases in the blood were obtained. The oxygen requirement of aviators at various altitudes and under various circumstances were determined, and excellent equipment was designed to supply these needs.

One of the classical problems in physiology was the search for a single chemical substance exerting absolute control over the activity of the respiratory centre in the brain. Many different substances had been invoked to fill this place, but each in turn had been shown to be out of accord with the facts in one or another respect. By rejecting the principle that a unique chemical agent is solely responsible for respiratory control and replacing it with the concept that a number of agents exert independent effects, a very valuable theoretical analysis of the factors controlling respiration was achieved. J. S. Gray's "multiple factor theory of respiration" postulated that respiratory activity at any given moment is determined by the sum of the partial effects of the separate agents. Exact mathematical formation of this theory proved to be in good accord with known facts and was useful in solving such problems as oxygen requirement at various altitudes and the effect on respiration of various disturbances of acid-base balance of the blood.

The Eye.—One of the most fundamental problems of physiology concerns the exchange of energy between the environment and the specialized receptors of sensation. Quantitative studies of these energy relations can be particularly well studied in the eye because of the extensive knowledge of photochemical reactions, which are the first step in the translation of the stimulus of light into nervous action. S. Hecht and co-workers measured the energy of a flash of light which could just be seen by a completely dark adapted human subject. The corrected value for the threshold energy absorbed by the rods was 5 to 14 quanta. It was concluded that a single quantum of light which can activate one molecule of visual purple is sufficient to excite a single rod cell of the retina; about six rod cells must be excited to elicit a threshold effect.

The retinal mechanisms concerned with colour vision were explored by R. Granit, who recorded the activity of retinal neurones in the eyes of various vertebrates with the aid of a microelectrode. In this way the activity of individual retinal ganglion cells could be discerned clearly. These electrophysiological studies of the action potentials of retinal neurones revealed that the retina contains "dominators" responsible for the white sensation and a number of "modulators" responsible for colour sensation. Although the modulators tended to fall into three groups corresponding to the three primary colours, it was clearly demonstrated that there was more than one type of modulator

for each primary colour. Consequently, theories of colour vision based upon the classical concept of three primary colours with one type of receptor for each colour could only give an approximate description of physiological events.

Hormones.—A number of the many factors in the anterior pituitary were highly purified, and their actions were carefully studied. The study of purified preparations revealed that the luteinizing hormone and the interstitial cell stimulating hormone are identical. The growth hormone was also obtained in very pure form, and it was shown to have certain diabetogenic effects. The adrenocorticotrophic hormone was also obtained in pure form. The thyrotrophic principle of the anterior pituitary was shown to be capable of producing exophthalmos in experimental animals, thus strongly indicating the presence of this hormone in excess in patients manifesting this symptom.

Isolation and synthesis of adrenal cortical steroids made great progress during the decade. It was clearly demonstrated that there are two groups of cortical hormones, one concerned with carbohydrate, fat and protein metabolism. Overactivity of the adrenal cortex or administration of cortical hormone was demonstrated to be capable of producing a degeneration of lymphoid tissue throughout the body with a concomitant rise in the gamma globulin fraction of the blood and the immune bodies associated with this plasmoprotein fraction. This lent strong support to the view that lymphatic tissue is a site of formation of antibodies.

A new principle in the study of hormone functions was introduced with the discovery of a group of compounds, of which thiouracil was the outstanding example, which could depress the function of the thyroid gland by interfering with the synthesis of the thyroid hormone. These substances did not interfere with the action of the thyroid hormone when the latter was given in a preformed state. These compounds found extensive use in the treatment of patients with hyperthyroidism.

A somewhat similar development was the discovery that the chemical alloxan and certain related chemical substances have a highly selective lethal action upon the B-cells of the islands of Langerhans of the pancreas, the cells which elaborate insulin. This provided a valuable experimental tool for the production of diabetes without operating upon or causing other injury to the animal. A single injection of this material into the experimental animal produced irreversible damage to the islet cells within a few minutes and resulted in permanent diabetes. In certain cases these animals manifested acidosis, ketosis, diabetic coma and cataracts, complications of diabetes frequently encountered in the human diabetic patient.

Intersexuality or hermaphroditism was produced experimentally by the administration of sex hormones to pregnant animals.

The Kidney and Hypertension.—Following the demonstration by H. Goldblatt that a persistent elevation of blood pressure could be produced in animals by interfering with the blood supply to the kidneys, much effort was directed toward the elucidation of the mechanism of this phenomenon. Since it was known that removal of both kidneys, although it results in fatal uremia, does not lead to the development of hypertension, it was reasoned that the hypertension produced by constriction of the renal artery must be due to some effect of impaired circulation in the kidney and not to lack of kidney function. When it was shown that severance of all possible nervous connections between the kidney and the blood vessels did not

prevent the high blood pressure from developing, it was concluded that a chemical substance of renal origin, circulating in the blood stream, was the cause of the rise in blood pressure. It was discovered that the kidney whose circulation had been embarrassed gave off an enzyme, renin, into the blood stream which acted upon one of the proteins of the blood plasma, hypertensinogen, or angiotonin. This latter substance caused the muscular walls of the small arteries or arterioles to contract and thus raised the blood pressure. The possibility that such a mechanism might operate in certain cases of human hypertension was actively investigated during the decade. By the use of experimentally induced renal hypertension, several promising methods of treatment of the condition were discovered. Both the parenteral administration of kidney extracts and the oral administration of certain oxidized marine oils were found to reduce the blood pressure of animals rendered experimentally hypertensive. The possibility of applying to the human disease the knowledge gained in the study of the mechanism and the treatment of experimental hypertension also received intensive study.

Acid-Base Balance and the Kidney.—One of the most important functions performed by the kidney is its role in preserving the proper ratio between acids and bases in the blood by excreting these components when they are present in excess. One of the means by which the kidney deals with excess acid in the blood is the formation of ammonia to neutralize the acid and the excretion of the ammonia-acid compound. The mechanism of this ammonia formation was determined. D. D. Van Slyke demonstrated that most of the urinary ammonia is formed in the kidney by the enzymatic cleavage of glutamine, an altered end product of protein digestion.

Another means by which the kidney rids the blood of excess acid is the direct excretion of this acid by the renal tubules. R. F. Pitts showed that this is accomplished in the distal portion of the renal tubule where hydrogen ions are formed intracellularly from carbonic acid which in turn arises from the combination of carbon dioxide, a by-product of cell respiration and water. The hydrogen ions are exchanged for sodium ions of the glomerular filtrate across the cell membrane.

Vitamin K.—The discovery of vitamin K was one of the great scientific events of the decade. Seeking the isolation of the dietary factor which causes haemorrhagic disease in chicks, chemists in various countries finally isolated and synthesized vitamin K. This vitamin was found to be present in a wide variety of food substances and also to be synthesized by intestinal bacteria. Vitamin K is not absorbed in the absence of bile from the intestine. After absorption, vitamin K acts in the liver, where it is essential for the formation of prothrombin, a blood proenzyme essential for the clotting mechanism. In jaundiced patients in whom bile is not present in the intestine, a deficiency of prothrombin with marked tendency toward haemorrhage occurs. Treatment with vitamin K corrects the bleeding tendency. When the liver is so severely damaged that it can no longer utilize vitamin K in the synthesis of prothrombin, a haemorrhagic tendency unresponsive to vitamin K therapy ensues.

Folic Acid and Thymine in Pernicious Anaemia.—The isolation of a substance known to be necessary for the growth of certain bacteria provided a crystalline synthetic chemical effective in the treatment of human pernicious anaemia. It was found that certain bacteria required a component of the vitamin B complex, formerly unidentified, for their growth. This substance was isolated in crystalline form from liver extract and was designated *Lacto-*

bacillus casei factor or folic acid. It was then found that this bacterial growth factor was also effective in the treatment of a nutritional anaemia of chicks. This suggested that it might be effective in human pernicious anaemia. When the substance had been synthesized, clinical trials in patients with pernicious anaemia and other types of macrocytic anaemia such as that encountered in sprue and the macrocytic anaemia of pregnancy showed it to be fully effective in producing remissions. Since thymine, a nucleic acid derivative, had been shown to be able to replace folic acid for sustaining bacterial growth, it too was tried in the treatment of human macrocytic anaemia and was found to be effective. Thymine must be used in much larger doses than folic acid, and it was suggested that folic acid is required for the synthesis of thymine in the animal body.

Digestive Tract.—Much new information on the role of hormones in the control of the functions of the gastrointestinal tract was gained. A new gastrointestinal hormone was described by A. A. Harper and H. S. Raper and its existence was confirmed. This hormone, pancreozymin, causes an increase in the output of pancreatic enzymes without affecting the volume of pancreatic juice secreted. Pancreozymin, like secretin which stimulates the production of water and salts by the pancreas, is derived from the mucosal lining of the upper small intestine. By suitable chemical procedure, separation of the two hormones into individual fractions was accomplished.

The Brunner's glands of the duodenum, which lie beneath the mucosa of the first portion of the small intestine, were shown to be under hormonal control. When a meal is fed to an animal in which the Brunner's glands have been separated from nervous connections by transplanting this region of the intestine to the skin, the glands secrete in response to the meal; likewise, injection of extracts prepared from the upper intestinal mucosa provoke secretion. These glands secrete an alkaline mucoid fluid and serve to protect the lining of the duodenum from the destructive action of the acid chyme entering the duodenum from the stomach.

Enterogastrone, the hormone which inhibits gastric secretion when fat is in the intestine, was purified from intestinal extracts. A gastric-secretory inhibitory substance was also found in canine and human urine and was termed urogastrone. Both urogastrone and enterogastrone concentrates were found to be effective in preventing experimental peptic ulcer in dogs, but the beneficial effect of treatment with these materials could not be ascribed to their gastric secretory depressing power. The remarkable feature of this mode of therapy, distinguishing it from previously employed means of treatment, is that after administration of the extracts had been discontinued the animals did not develop ulcer but manifested a prolonged "immunity" toward ulcer development. Preliminary trials in human ulcer patients yielded encouraging results.

Function of the Frontal Lobes of the Brain.—The introduction of the surgical treatment of psychosis by separating the tracts which connect the frontal lobes to the rest of the brain afforded an unusual opportunity to observe the alterations in behaviour wrought by this procedure and thereby to deduce the normal function of these important areas of the human brain. Such studies revealed that the absence of the frontal lobes produces personality defects which, in spite of their obvious importance, resist accurate objective description. The most fundamental defect appears to be an imperfection in perception or the association of sensations. This is manifested by distracti-

bility, poor judgment of time, slower response to stimuli and inability to shift from one perception to another. Information of this kind is of basic importance for an understanding of the physiological basis of personality structure.

(See also ENDOCRINOLOGY; PSYCHOLOGY; VITAMINS.)

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(A. C. I.)

Piazza, Adeodato Giovanni

Cardinal Piazza (1874-), Italian Catholic prelate, was born Sept. 30, 1874, at Vigo di Cadore near Belluno, Italy. He was a member of the order of the Discalced Carmelites and served in World War I from 1915 to 1918 as a military chaplain on the Italian front. He was decorated for valour following the armistice. He was appointed archbishop of Benevento in 1930, and was elected patriarch of Venice in 1935. He was created cardinal at the consistory of Dec. 13, 1937.

P.I.C.A.O. (Provisional International Civil Aviation Organization)

See INTERNATIONAL ORGANIZATIONS; UNITED NATIONS.

Pierlot, Hubert

Pierlot (1883-), Belgian statesman, held many important cabinet posts in the Belgian government from 1934 to 1939. In February of the latter year, he became prime minister and in May 1940, the German invasion forced him to move his government to France. After the collapse of the French armies, Pierlot and his government fled to Spain and thence to London, where they set themselves up as the Belgian government in exile. Originally, Pierlot condemned King Leopold's surrender to the Germans, May 28, 1940, but later revised this judgment, declaring that Leopold was not collaborating with the Germans.

After four years of exile, Pierlot and his government flew back to Brussels on Sept. 7, 1944; shortly thereafter he resigned and formed a new government. Unable to cope with the economic difficulties and popular unrest in Belgium, Pierlot, in an address before parliament, blamed the Allies for Belgium's plight.

Hostility greeted his statement and the following day

(Feb. 7, 1945) he handed in his resignation.

Pig Iron

See IRON AND STEEL.

Pigs

See HOGS; LIVESTOCK.

Pimento

See SPICES; VEGETABLES.

Pineapples

See FRUIT.

Ping-Pong

See TABLE TENNIS.

Pinta

See DERMATOLOGY.

Pittman, Key

Pittman (1872-1940), U.S. senator, was born in Vicksburg, Miss., Sept. 19, 1872, and received his education from private tutors and in the Southwestern Presbyterian university at Clarksville, Tenn. He began the practice of law in Seattle, Wash., in 1892. In 1897 he went to Alaska, worked as a miner for two years and became first district attorney of Nome, in which office he fought to protect the rights of miners. In 1901 he left Alaska and settled in Tonopah, Nev., where he again practised law. He was elected to the U.S. senate in 1912 to fill an unexpired term and was re-elected five times, the last in 1940. He became chairman of the committee on foreign relations in 1933. Opposed to U.S. participation in foreign wars, he nevertheless believed that the nation should not isolate itself completely from the rest of the world. As a delegate to the London Economic conference in 1933 he obtained an agreement for stabilizing the production and the price of silver.

At the time of his death in Reno, Nev., Nov. 10, 1940, he was president *pro tem* of the senate.

Pittsburgh

During World War II there was no great influx of new industries in Pittsburgh, Pa.; there was, however, prompt conversion and expansion of existing establishments. In coal, iron and steel, electrical manufacturing, and in transportation, new statistical records reflected the contribution of the district to Allied arms.

As the decade 1937-46 ended, reconversion to peace had been completed.

Western Pennsylvania produces roughly one-fourth of the U.S. total of bituminous coal, of pig iron and of steel ingots. It is significant, in appraising its contribution to war production, that the region's industry was already geared high before Pearl Harbor. Although in 1939 it had not fully kept pace with the country in recovery from the paralysis of 1932-33, the uprush in 1940-41 was somewhat more vigorous in the district than it was nationally.

Factory operations continued at high levels until war contracts were cut back, although the gains after 1941 were somewhat less pronounced than those for the country as a whole.

The increase in total number of wage earners employed, as shown by the employment index of the University of Pittsburgh, roughly paralleled the gain in total civilian nonagricultural employment as estimated by the United

States bureau of labour statistics. There were four major interruptions to economic activity during the period, associated with the coal strikes of 1939 and 1941, the recession of early 1940 during the quiescent period of the war in Europe, and the prolonged steel, electrical and coal strikes in the early months of 1946.

From 1937 to 1944, the seasonally-adjusted monthly index of production (manufacturing and mining) in the district, as computed by the bureau of business research of the University of Pittsburgh, ranged, in terms of percentage of the 1935-39 average, from 56 for June 1938, to 196 for May 1944. In the months from Jan. 1945 to July 1946, inclusive, the range was from 187 for March 1945 to 94 for May 1946. In the general index, inclusive of production, trade and shipments, the range was less extreme than that of the production index but was nevertheless very wide.

In 1941, for the first time in 130 years, a United States war vessel was launched in greater Pittsburgh. A total of 298 ships subsequently were delivered to the navy, of which 264 were L.S.T.s (landing ships tanks). Largest new wartime industrial development was a \$50,000,000 plant for production of synthetic rubber chemicals.

Rail transportation was supplemented by increased tonnage on the three rivers which had historically made Pittsburgh the "gateway to the west." This water-borne freight in the United States army's Pittsburgh engineer district reached a peak of nearly 40,000,000 tons in 1942, about 85% of which was carried on the heavily-industrialized Monongahela.

Advance in air transportation was assured, as the decade ended, by a people's bond issue in Allegheny county of \$6,000,000 for the completion and extension of a new 1,600-ac. airport upon which \$5,500,000 had already been expended for the U.S. army during the war.

Completion in 1940 of the 160-mi. \$70,000,000 high-speed Pennsylvania turnpike to its western junction with U.S. route 30 at Irwin, 20 mi. east of Pittsburgh, greatly increased highway capacity over the Allegheny mountains to the eastern seaboard.

Two notable bank mergers in 1946 affected a closer knitting of the city's financial resources. The larger of these created the Mellon National Bank and Trust company with total resources of \$1,140,000,000 and deposits of \$980,866,000.

Scientific research and development were advanced by expansion of industrial and educational laboratories. Industrial research increased twofold, and research on the fundamental structure and properties of matter, not related to any specific application, was undertaken on a scale far beyond that of any former period. In this latter development the University of Pittsburgh and Carnegie Institute of Technology had a leading part, enlarging their staffs for the growing programs. The university created a new division of research in the natural sciences. At the institute, in 1945, Dr. Otto Stern received the Nobel award in physics. During the war both institutions contributed to work of the Office of Scientific Research and Development. As an outgrowth of earlier nuclear studies, Westinghouse scientists participated, for the Manhattan project, in the development of practical means for separating uranium isotopes. Significant contributions also were made by this laboratory in the development of radar and other electronic devices. The aluminum industry was revolutionized for large-scale production by the development of the Alcoa direct-chill continuous-casting process, permitting production of ingots weighing up to 5,000 pounds or more; and important new alloys were developed.

Industrial laboratories in the oil and steel industries were notably expanded. Mellon institute, outstanding laboratory for industrial research, dedicated a monumental new building in 1937, the gift of Andrew W. and Richard B. Mellon. During the decade it conducted more than 200 separate research undertakings and enlarged its program of pure research. Pittsburgh's scientific leadership was highlighted in 1946 when a three-day public forum on "Science and Civilization," marking the centennial of the birth of George Westinghouse, was attended by more than 600 of the nation's foremost scientists, educators and industrial leaders.

The decade was also marked by advances in facilities for higher education. Despite mobilization of students and faculty members for national service in the war years, the end of the decade found universities and colleges largely increased in enrolment, endowments and physical plant.

Three notable contributions to the cultural resources of the district were recorded. In 1938 the Pittsburgh Symphony orchestra was augmented under the direction of Fritz Reiner. In 1946, for the first time, a two-month season of open-air civic light opera was presented to a total attendance of 270,000. In 1939 the Buhl Planetarium and Institute of Popular Science was dedicated, a gift to the city of Pittsburgh in memory of Henry Buhl, Jr. Carnegie institute planned to resume, in 1947, its famed international exhibition of art, suspended after 1939.

* * *

NOWHERE was civic awakening more brightly reflected than in the field of city planning and public works. Midway in the decade the Pittsburgh Regional Planning association sponsored proposals for improvement of transportation facilities evolved by a study headed by Robert Moses. The city planning commission produced a land-use survey, published an analysis of the city by improvement districts and a basic volume, *Groundwork and Inventory for Master Plan* and launched upon a city-wide rezoning study. County and city planning commissions joined in organizing a program of postwar public works. The Allegheny Conference on Community Development, an outgrowth of citizen-sponsored, wartime planning for postwar years, carried on an extensive program of community studies. Land acquisition was begun preparatory to creation of a 36-ac. memorial park at the confluence of the Allegheny and Monongahela rivers, commemorating Fort Duquesne and Fort Pitt. Ground was broken in 1946 for a high-speed parkway extension of routes 22 and 30 from the east to connect with the inner downtown traffic loop, first water-front sections of which had been built earlier in the decade. Plans called for extension of this through-artery to the west by a new bridge across the Monongahela and a tunnel under precipitous Mt. Washington.

Progress was made in attack upon the long-standing problems of flood control, smoke control and abatement of stream pollution.

The advent of 1937 found the city still reeling from the devastating effects of the most disastrous flood in its history, that of St. Patrick's day of the preceding year. Subsequently the federal government approved a program for the building of 13 flood-control dams in the headwaters of the Allegheny and Monongahela rivers and their tributaries, draining from four states. Six of these were completed and construction of a seventh begun, at a cost of nearly \$80,000,000. They were collectively capable of reducing the water level at Pittsburgh, on the basis of

its worst flood experience, by 9 ft. This program had a vitalizing effect upon the city's business district and in its low-lying industrial areas.

Limited enforcement of a smoke-control ordinance, enacted before the war, was begun in 1946.

More than a score of municipalities, including Pittsburgh, signed contracts with the newly-formed Allegheny County Sanitary authority for the preparation of plans for sewage disposal plants. New state legislation promised some relief from industrial stream-pollution by requirement for backfilling after strip mining of coal. Indications were that this advance would be supplemented by a renewed program of sealing abandoned underground workings.

Chatham Village—pioneering example of the large-scale planned garden-homes community, privately financed as a long-term investment—was completed as the decade opened and exerted a nation-wide influence upon urban housing. Other private housing in Allegheny county during the decade was principally financed by Federal Housing administration insurance of loans on 17,702 homes representing a total investment of \$117,250,933. Programs of federally-subsidized permanent public housing in 29 projects provided 10,829 dwelling units in Allegheny county, of which 5,462 were in Pittsburgh. In addition, temporary housing under federal programs provided 1,979 units. At the end of the decade the housing shortage was acute, although the pace of construction was accelerated in the summer of 1946 under the stimulus of guaranteed loans by the United States Veterans' administration.

The A. W. Mellon Educational and Charitable trust announced in 1946 that it would devote a major portion of its remaining assets, approximately \$50,000,000, to the development and improvement of conditions and institutions of the Pittsburgh area. Previously the principal activity of the foundation had been in the building and endowment of the National Gallery of Art in Washington, D.C. Among other significant developments was the establishment of the Pittsburgh foundation, a community trust, to receive and administer gifts and bequeaths, designated or undesignated.

During the war years, population increased little more than the 671,659, as enumerated in 1940. This was slightly less than one-half the population of Allegheny county, including 3 other cities, 68 boroughs and 53 townships. The city area was approximately 54.3 sq.mi. (C. F. Ls.)

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Pius XI

Pius XI (1857–1939) was born of middle-class parents, Francesco and Teresa Ratti, at Desio near Milan, Italy, on May 31, 1857, and christened Ambrose Damien Achille. His seminary training was received in Milan and in Rome, where he was ordained to the priesthood on Dec. 20, 1879.

After obtaining academic degrees in theology, philosophy and canon law, he returned to Milan and was assigned to parish work until his appointment in 1882 to the faculty of St. Charles seminary as professor of dogmatic theology and sacred eloquence. In 1888 Father Ratti was named to fill a vacancy among the doctors of the Ambrosian library in Milan, and in 1907 he became its prefect. The policies he introduced widened the influence of the great library, and the writings he published, chiefly

in the field of Milanese history and Latin paleography, enhanced its prestige. He found an outlet for his pastoral zeal as chaplain to a community of sisters, as a religious instructor of poor children and as a trusted aide of Andrea Cardinal Ferrari in the development of his social program. For recreation he maintained his youthful interest in mountain climbing, a sport in which his proficiency is evidenced in his own memoirs and in the tributes of expert Alpinists.

Appointed vice-prefect of the Vatican library in 1912, he was made its prefect at the outbreak of World War I. Monsignor Ratti's scholarly seclusion was abruptly terminated four years later, when he was assigned the difficult task of apostolic visitor in a resurgent Polish nation whose religious life was badly disorganized. His tactful and devoted efforts were so successful that he was made the first papal nuncio to the newly established Polish republic and consecrated as titular archbishop of Lepanto in the Warsaw cathedral on July 19, 1919.

In March 1921 he was named archbishop of Milan and was created cardinal in the consistory of the following June. While still engrossed in the problems that face a new bishop, Cardinal Ratti was summoned to Rome for the conclave which followed the death of Benedict XV and which on Feb. 6, 1922, elected him as the 260th successor of St. Peter.

During his 17-year reign, Pius XI met the problems of his time with apostolic vision and firmness. In Italy the Lateran accord of 1929 guaranteed the spiritual independence of the Holy See and vindicated the position which the "prisoner popes" had valiantly defended since the seizure of the papal states in 1870. It also included a concordat which secured the freedom of the church in promoting the spiritual welfare of the faithful. In his pastoral guidance of the universal church, Pius XI consistently urged the need of dynamic faith in everyday life. To the world at large he stood out as an inspiring religious leader and a courageous defender of the dignity and rights of men against economic oppression and totalitarian tyranny. His better-known encyclicals, keen in their analysis and uncompromising in their denunciation of fascism (*Non Abbiamo Bisogno*), nazism (*Mit Brennender Sorge*) and communism (*Divini Redemptoris*), or constructive in their outline of a Christian program for the reform of economic and industrial society (*Quadragesimo Anno*), rank among the great papal documents of all time. On Feb. 10, 1939, death brought to a close the vigorous pontificate of Pius XI—the first pope whose voice was literally heard around the world, speaking, as he himself said, "not only as Head of the Catholic Church but also as a man of our day . . . as a witness of the events which menace our contemporaries and the institutions which frame and develop their daily individual, family and social life."

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Pius XII

Pope Pius XII (Eugenio Maria Giuseppe Giovanni Pacelli) (1876–), was born in Rome, March 2, 1876, of noble though not wealthy ancestry. His mother, Virginia Graziosi, came from a distinguished Roman family and his father, Filippo Pacelli, was a frequent legal con-

sultant to Leo XIII and Pius X. Under Gregory XVI and Pius IX both of his grandfathers, following the deeply religious traditions of the family, held offices associated with the Holy See.

The boy, Eugenio Pacelli, possessed exceptional qualities of character and intellect. In 1894 he graduated from the celebrated Ennio Quirino Visconti school with highest honours, and a commemorative plaque there records that "velut oriens sidus emicuit qui nunc fulget in orbe terrarum" (like the rising sun, first appeared here he whose splendour now shines throughout the world).

That same year Eugenio Pacelli manifested a vocation to the priesthood and in the autumn entered the College of the Capranica founded in 1457, the oldest of the Roman seminaries. He completed his studies in philosophy in the pontifical Gregorian university, and his courses in theology and in canon law were taken in the pontifical Roman seminary, from which he received degrees in both subjects *summa cum laude*. During the solemnity of Eastertide, April 2, 1899, he was ordained to the priesthood, and on the following day Father Eugenio Pacelli offered his first holy sacrifice of the mass in the Borghese chapel of the Basilica of St. Mary Major.

For two years following his ordination the young priest

Pius XII giving his blessing as a procession followed him to the Church of St. John Lateran, Rome, in May 1939. It was his first departure from the Vatican after he was crowned pope two months earlier



served as a curate and combined the works of the ministry with the apostolate of teaching. His zeal for the salvation of souls and his genius as a professor became known to the officials in the secretariate of state, Monsignor Giacomo Della Chiesa, the future Pope Benedict XV and Monsignor Pietro Gasparri, the subsequent secretary of state to Popes Benedict XV and Pius XI. Because of his diverse abilities and especially because he was an able jurist, Monsignor Pacelli was appointed a member of the Sacred Congregation for Extraordinary Ecclesiastical Affairs, and in 1912 he became secretary of that congregation, the first section of the secretariate of state.

Monsignor Pacelli was assistant both to Cardinal Merry del Val, secretary of state to Pope Pius X, and Cardinal Gasparri, secretary of state to Pope Benedict XV. In addition to the regular duties of his office, the fervent young monsignor was assigned to the gigantic task of codification of canon law.

On April 20, 1917, while World War I was raging, Monsignor Pacelli was appointed apostolic nuncio to Bavaria and was consecrated titular bishop of Sardis by the holy father himself, Pope Benedict XV. The consecration took place on May 13, 1917; among those present at the sacred rite was Monsignor Achille Ratti, then a simple prelate, who was later to become Pope Pius XI. The new nuncio's integrity, scholarly gifts and wise counsels won the respect of Kaiser Wilhelm II and his chancellor of the reich, Bethmann Hollweg, and the activity, apostolic zeal and vibrant oratory of the distinguished prelate were everywhere proclaimed.

In 1920, Archbishop Pacelli, continuing in his office as apostolic nuncio to Bavaria, was named nuncio to Germany, and in that same year he left for Berlin. After four years of increasing, tireless work, the solemn convention between the Holy See and Prussia was concluded, and the concordat with Bavaria was ratified Jan. 24, 1925.

Pope Pius XI elevated Archbishop Pacelli to the cardinalate in the consistory of Dec. 16, 1929, and assigned to him the title of the Church of Saints John and Paul. On Feb. 7, 1930, the holy father, in a letter written in his own hand, appointed Cardinal Pacelli to succeed Cardinal Gasparri as secretary of state, and from that day began a new era in the life and labours of this devoted, faithful interpreter of the will of the Holy Father.

Cardinal Pacelli was an extensive traveller. On several occasions he represented Pope Pius XI as papal legate—at Lourdes, France, April 1935; Lisieux, France, July 1937; Buenos Aires, Argentina, Oct. 1934 and Budapest, Hungary May 1938. In 1901, as Monsignor Pacelli, he had journeyed to London with Monsignor Merry del Val to convey the official condolences of Leo XIII on the occasion of Queen Victoria's death, and in 1908 he returned to London with the papal legate to the Eucharistic congress. He again went to England in 1910 as a member of the papal mission, representing the pope at the coronation of King George V and Queen Mary.

Cardinal Pacelli arrived in the United States on Oct. 8, 1936, for a visit of several weeks, during which time he toured the country and covered more than 8,000 mi. by air. He visited New York city, Boston, Mass., Hartford, Conn., Cleveland, O., South Bend, Ind., for a visit to the University of Notre Dame, Chicago, St. Paul, Minn., San Francisco, Los Angeles, St. Louis, Mo., Cincinnati, O., Washington, D.C., Baltimore, Md., and Philadelphia and other cities where he met and talked with many leading U.S. citizens in both civil and religious life. The people

of the U.S. were magnetized by the calm spiritual majesty and democratic ardour of Cardinal Pacelli. He visited and lunched with President Roosevelt at Hyde Park, N.Y., and one of his first acts on returning to his desk in the Vatican was to write the president: "My travels in the United States left impressions on me among the deepest of my whole life."

In the consistory of April 1935, Cardinal Pacelli was elected Cardinal Camerlengo of the Sacred College of Cardinals, a position which on the death of the pope places upon the incumbent the responsibility for the administration of the affairs of the church until a new pope is elected. After the death of Cardinal Merry del Val, Cardinal Pacelli became archpriest of Saint Peter's, and on the death of Pius XI on Feb. 10, 1939, he assumed the administrative government of the church and the state of Vatican City.

In the conclave that was convoked for the evening of March 1, 62 cardinals of 27 different nationalities met to elect the successor to Pope Pius XI. The announcement of the election of Cardinal Pacelli was made a little after six o'clock on March 2, his 63rd birthday. That evening as Pope Pius XII, the name he chose in tribute to the two pontiffs under whom he had spent most of his active life as a churchman, the holy father imparted his blessing to the city and the world, *Urbi et Orbi*. His coronation took place on March 12, 1939, in the Basilica of St. Peter, in the presence of a vast concourse of people with 36 nations officially represented.

As pope, Pius XII will ever be remembered as the fearless advocate of a just and lasting peace, the unequivocal opponent of all forms of state-idolatry and race prejudice and the staunch defender of natural human rights and basic human freedoms of man.

The Holy Father had early become an inspiring speaker, using no manuscript and memorizing most of his important addresses, fluently delivered in any one of seven languages. From the world radio broadcast of Aug. 24, 1939, in which he uttered the phrase "nothing is lost by peace, all can be lost by war," to his radio message of May 9, 1945, at the end of World War II in Europe, Pope Pius XII's writings, teachings and pleadings were for world peace with justice, to which the seven volumes of his collected addresses bore eloquent testimony. Again and again he pleaded that international agreement make war less inhuman by confining it to combatants and denounced the horrors of indiscriminate bombings of noncombatants—the women and children, the sick and aged, the hospitals, charitable institutions and houses of prayer. During the entire war he remained in Rome, and when the city was bombed by the U.S. air force on July 12, 1943, unguarded and unafraid, he hurried to the scene of disaster and gave his blessing and personal aid to the afflicted. He wept and prayed with his people as they stood before the bombed Basilica of San Lorenzo.

During the war, the Holy Father instituted the office of information concerning war prisoners and refugees, to which was later added the Pontifical Commission for Assistance which furnished food, clothing, medicines for the poor, the suffering, the sick, the wounded and imprisoned. In humility, simplicity, understanding and sympathy throughout the war, he prayed and pleaded for "the sorrowing hosts of mothers, widows and orphans, numberless exiles and hundreds of thousands of persons, who without any fault on their part, sometimes only because of their nationality or race, had been consigned to death."

In the relations of the pope with various states may be recorded the concordat with Portugal, May 7, 1940; the agreement with the republic of Haiti, Jan. 31, 1941; with Spain, June 7, 1941; with Colombia, April 22, 1942, and the intervention for the peoples' solution of the conflict between Peru and Ecuador 1941; historic telegrams to the sovereigns of the Netherlands, of Belgium and of Luxembourg of May 10, 1940, at the beginning of the unjust invasion of those countries by the German troops; the letter to the Swiss federal council on the 650th anniversary of the confederation.

A few of the Holy Father's pontifical documents were the encyclical *Summi pontificatus* of Oct. 20, 1939, which traced the general program of the papal activity; the encyclical letter *Sertum laetitiae* to the hierarchy of North America on Nov. 1, 1939, for the 150th anniversary of the establishment of the American hierarchy; the encyclical *Saeculo exeunte* of June 13, 1940, to the Portuguese bishops on the occasion of the eighth centenary of the independence of the nation and the third centenary of the freedom; the encyclical *Mystici Corporis Christi* of June 29, 1943; the encyclical *Divino afflante spiritu* of Sept. 30, 1943, on the most opportune method of promoting Bible studies; the encyclical *Orientalis ecclesiae* of April 9, 1944, for the 15th centenary of the death of St. Cyril of Alexandria; the encyclical *Orientales omnes* on the occasion of the 350th anniversary of the union of the Ruthenian Church to the Apostolic See, dated Dec. 23, 1945; the encyclical *Communium interpretes* of April 15, 1945, with its direction for public prayers for peace among people; the encyclical *Quemadmodum* of Jan. 6, 1946, to invoke help for children struck by the consequences of the war.

During the pontificate of Pius XII, Gemma Galgani and Maria di S. Eufrasia Pelletier were canonized on May 2, 1940, Margaret of Hungary, Nov. 19, 1943, and on July 7, 1946, was canonized the first American saint, Mother Frances Xavier Cabrini.

On Dec. 23, 1945, 32 archbishops and bishops from 5 continents were named cardinals of the church. In its number and universality, this event was unique in the history of the church. On Feb. 18, 1946, in a secret consistory in the Eternal City, these 32 prelates from 18 nations were formally elevated to the sacred college of cardinals.

The name-day of St. Eugene, the patron saint of his holiness, is June 2. The family name, Pacelli, is significantly a derivative of the Italian *pace*, which means "peace" and on the papal coat of arms is a dove with an olive branch. In the celebrated prophetic list of Saint Malachy, the holy father was described as *Pastor Angelicus*, angelic shepherd, and daily he worked, prayed and literally died for peace among men. He knew that revenge is a bitter, gnawing thing; that hate begets hate and brutality spawns brutality. "All nations, great and small, have a right to live" declared his holiness as he begged that the victors temper their victory-in-arms with charity and justice in peace. (See also ROMAN CATHOLIC CHURCH; VATICAN CITY STATE.) (F. J. SN.)

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Pizzardo, Giuseppe

Cardinal Pizzardo (1877–), Italian prelate, was born June 13, 1877, in Savona, Italy. Entering the priesthood in 1903, he rose to the post of undersecretary of state in 1921 and secretary for extraordinary ecclesiastical af-

fairs to Pope Pius XI in 1929. He was named titular archbishop of Nicea in 1930. He was appointed papal legate to the coronation of King George VI (1937) and later that year (Dec. 13, 1937) was created and proclaimed cardinal priest. In the following year (1938), he was made president of the central office of Catholic action. Cardinal Pizzardo became prefect of the congregation of seminaries and universities in 1939.

Plague, Bubonic and Pneumonic

Although much of the natural history of plague had been known for nearly half a century, and considerable progress had been achieved in the development and application of measures to combat its spread within communities and to remote areas, it still remained a menace to the people of the world at the end of the eventful decade 1937-46.

Cognizance of the persistence of this threat was reflected in international agreements on the subject. Its classification as one of five quarantinable diseases (cholera, exanthematous typhus, plague, smallpox, yellow fever) was continued in 1944 by a special committee of international experts in co-operation with the International Office of Public Health of Paris, and with the United Nations Relief and Rehabilitation administration. Their recommendations became amendments to the Agreements of the International Sanitary convention of 1926, providing for maritime quarantine, and to the International Sanitary Convention for Aerial Navigation of 1933. Seventeen countries were signatories of the two amended agreements which came into force on Jan. 15, 1945. These countries agreed to notify one another of the occurrence of plague in man or in rodents on their ships or planes or in their ports, and to execute measures to prevent its spread to other countries.

Prevalence.—Plague is primarily a disease of rodents. Among these, rats (*Rattus*) of a few species continued to be of special importance, since they frequent the haunts, habitations and public conveyances of people, and are also transported in commercial shipments. The disease prevails in man and animals of Africa, the Americas, Asia, Europe and some Pacific islands; its types continued to be deadly. However, during the decade 1937-46, there was a marked decrease in incidence in man, and probably rats, in the principal ports of the world, insofar as could be determined from reports available before and during World War II. The cause of this reduction was not clearly discernible. Advances had been made in the prevention and treatment of cases, and in the destruction of rats and their infesting fleas. The execution of these antiplague measures in endemic areas, on ships, and in ports may have been the contributing factor; or, the change may have been brought about through undetermined natural phenomena.

There were no epidemics of unusual proportions during this period, but rat-borne outbreaks appeared during World War II in the Punjab, along the Burma road in Yunnan, in Thailand (Siam) and in some northern provinces of China. The Mediterranean area was revisited. Morocco reported 1,098 cases in 1940, 2,337 in 1941, and 583 in 1942, and the Casablanca district continued to be affected. Suez, Port Said, Ajaccio and Taranto each had sharp but limited outbreaks. There was a reappearance at Dakar, with 562 cases reported between April and the end of the year of 1944.

Cases occurring in the interior of India, China and South American countries at distances relatively remote from ports, as well as those in Madagascar and Pacific islands, were attributed to infection among rats. Those

occurring in Africa, the U.S.S.R., Manchuria and North America apparently were contracted from field rodents.

The disease continued to be widely disseminated among rodents of the Veldt in the Orange Free State, Cape Colony, Bechuanaland, Basutoland, Northern Rhodesia, and other portions of Africa. Many cases arose from these animals, some of which invaded human habitations. On the contrary, very few cases developed in consequence of widely-spread infection among analogous animals in Alberta, Canada, and in the western United States.

The natural history of plague in these wild field rodents was the subject of intensive studies in Africa, the U.S.S.R. and the U.S. Spontaneous or naturally-acquired infection was found among many genera of Scuridae (squirrels and marmots), Muridae (mice, rats, gerbilles), Jaculidae (jerboas), Leporidae (hares) and Cavidae (cavies). During the decade 1937-46, successive surveys of the field animals were made in western states of the U.S.A. Specimens of 26 genera of Rodentia and of nineteen genera of other orders, and of 53 genera of fleas were collected and examined. Plague was found in the tissues or in the infesting fleas of 12 species of *Citellus* (ground squirrels), of twelve other genera of rodents, and of *Mustela* (weasels), *Taxidea* (badgers) and *Lepus* (hares). Among a portion of the genera of fleas adequately investigated under laboratory control, there were 36 species which became infected and 19 which proved to be capable vectors of the infection to guinea pigs or white mice. Infected ticks and lice were also collected from these field animals.

These systematic field surveys, accompanied by laboratory researches, contributed to the method of detection of plague in advance of the development of the disease in man. They demonstrated also the practicality of detecting foci of infection in rodents through the collection and examination of their ectoparasites. These field collections and investigations in field and laboratory also furnished presumptive evidence that fleas remaining in burrows or nests of these animals serve as a reservoir to carry over the disease from season to season. Similar surveys and studies in Alberta, Canada, South Africa, and the U.S.S.R. led to comparable results and conclusions.

Prevention.—The prevention of outbreaks of plague in man and the reduction of the mortality caused by it in endemic areas, through the immunization of people by prophylactic inoculations, had been subjects of research for many years.

The prophylactics or "vaccines" had been prepared by different formulae of manufacture, but they had adhered to W. M. W. Haffkine's principles rather consistently. These involved the use of dead plague bacteria and the toxic products resultant to their growth. The specific bacterium, *Pasteurella pestis*, is grown in a suitable media and then killed by heating or by the addition of a chemical. Reports on the efficacy of these vaccines in reducing either the incidence or mortality of the disease were inconclusive or conflicting. However, efforts to improve them were the subject of renewed and consistent investigation. Strains of the bacterium which have the maximum ability to produce neutralizing substances in the body (antigenic qualities) were sought and selected; methods of manufacture and of testing, and of determining their value in protecting white mice against artificially-induced plague were technically improved and standardized. The advocates of these preparations consistently maintained their superiority, and they were used as a protective measure for troops of the Allied armies which

operated in areas in which plague had been endemic.

Some of these vaccines made of the dead bacteria unquestionably reduced the mortality among laboratory animals in which plague was induced. However, their efficacy in immunizing the individual to a degree which wards off the disease, or even to that which diminishes its severity, continued to be challenged by able investigators.

In 1934 an investigator in Java and one in Madagascar had made vaccines from live plague bacteria which failed to produce the disease when introduced into guinea pigs, a very susceptible animal. These preparations of virulent organisms were used extensively during the decade and gave promise of being a notable contribution to anti-plague measures if the recorded observations of their work were further validated. On the other hand, the introduction of live pathogenic bacteria into human beings was attended with the risk that the avirulent forms might assume a virulence under the conditions of the human host environment.

The Madagascar vaccine was made from a strain of bacteria obtained from a human case of plague (E.V. strain) and was introduced as a prophylactic in 1935. During the succeeding three years, over 2,000,000 vaccinations were made, and the originators of this vaccine claimed that an 80% reduction of mortality was accomplished. The incidence of the disease recorded during the five years 1933 to 1938 was 3,493, 3,605, 3,035, 1,376, and 596 respectively.

The vaccine used in Java was prepared from a strain isolated from a dead rat (Tjiwidej strain) and was put into practical application during 1935 also. By the end of the year 1939, there were 9,286,237 vaccinations performed. During the four-year period, a great reduction in both the incidence and mortality was reported. The originator of this vaccine believed also that the mortality of the disease had been reduced to 20% of the cases and that it might be reduced to 10%.

The immunization of people against plague was accompanied by anti-rat measures in Java. The remodelling or construction of dwellings to make them resistant to the invasion and harbourage of rats was an integral part of the antiplague campaign, and by the end of the year 1938, these changes had been accomplished in 1,525,364 houses. During that year, 56,225 had been remodelled, and 54,548 were built in accordance with approved designs.

In fact, renewed interest was focused on improvement of methods for the control of rats and on more extensive practice of established methods. The movement of these rodents from port to port and consequent transportation of their diseases was greatly restricted by systematic inspections, fumigations and revision of ship construction to render it relatively rat-proof. New ships included this construction, and older ships were remodelled. The rat-riddance attributed to these measures was indicated in reports on ships arriving at Atlantic ports in the U.S. Between July 1, 1936, and Jan. 31, 1937, there were only 8.4% of 4,418 entering ships which were infested, in comparison with 50% of the entries at New York between 1925 and 1927.

Protection of troops during World War II from rodent-borne diseases required measures for the most rapid destruction of these animals that could be effected. Fumigation, with preparations of hydrocyanic acid gas, was applied to ships, buildings and to burrows. Two chemicals were found to be very toxic to rats when used with baits. Sodium fluoracetate, commonly known as 1080 during the war, is very soluble in water and appeared to be an ex-

cellent rodenticide. It can be offered to rats in drinking water or in solid food baits. Alpha-naphthyl thiourea (ANTU) is also very poisonous to Norway rats when used in the form of a powder on suitable baits. The relative toxicity of these two chemicals to rats was determined by administering the dose to the animal through a stomach tube. The lethal amount for rats per 1,000 grams of weight, and, for comparison, the deadly dose of strychnine sulphate was found to be as follows: 0.22 mgm. of 1080 per kilogram of animal; 4.8 mgm. of strychnine sulphate; and 6.3 mgm. of ANTU.

The discovery in 1939 that dichloro-diphenyl-trichlorethane (DDT) was an effective insecticide was quickly applied in a practical manner. The use of this chemical in a mixture of an inert powder for dusting, or dissolved in oil, such as kerosene, for spraying against lice, flies and mosquitoes was widely adopted. Experimentally, it appeared also to be a valuable pulicide. During an outbreak of 562 cases of plague at Dakar, S.W. Africa, in 1944, both people and their habitations were dusted and sprayed with it, and observers concluded that these measures hastened the subsidence of the outbreak. These tests were made in an emergency and during the period when the epidemic seemed to be declining. However, other tests were in progress to determine its value for suppressing flea infestations in structures and burrows under controlled conditions. The results obtained by 1946 suggested that this insecticide might be a valuable addition to antiplague measures.

Treatment.—In 1935, it was found that sulfonamide compounds protected white mice against experimentally-induced infections with a strain of virulent bacteria (streptococci). This observation led to widely-spread studies of their chemotherapeutic properties against other infections. It appeared that the antibacterial qualities are not directly bactericidal, but check the growth of bacteria through interference with some processes of their metabolism and multiplication and afford better opportunity to the defense mechanisms of the host to combat the infection. The different chemical derivatives also display quantitative selection in their action against specific bacteria. Sulfanilamide, sulfathiazole, sulfapyridine, sulfadiazine, and sulfapyrazine were used in the therapy of plague in China, India, South Africa and South America. Sulfadiazine and sulfathiazole were reported as valuable in reducing the mortality of the bubonic form of the disease if the drugs are administered in adequate dosage early in its course and are continued until convalescence is established. Sulfadiazine was preferred by several investigators. A report of the use of sulfathiazole and sulfadiazine in treating 349 cases was as follows: The mortality among 90 admissions given sulfathiazole was 33.1%, among 90 alternate admissions given sulfadiazine, the mortality was 21.9%, while 58.1% of 169 cases died after the customary treatment with iodine. The exclusion of those cases which were moribund at admission suggests that a greater reduction occurred in the mortality.

There was ample evidence of notable advances during the decade 1937-46 toward understanding the natural history of plague and devising means for its control. However, experience with the natural fluctuations in the incidence and severity of this and other infectious diseases during previous epidemics and pandemics cautioned against undue optimism over the apparently beneficial effects of individual control measures. Thus, complacency over later attainments was not justified; rather there was need for consistent alertness and effort to learn more about plague.

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Plant Industry, Soils and Agricultural Engineering, Bureau of

See AGRICULTURAL RESEARCH ADMINISTRATION.

Plant Nutrition

See BOTANY.

Plasma, Blood

See MEDICINE; MILITARY MEDICINE; PHYSIOLOGY; SURGERY.

Plastics Industry

The dynamic growth of the plastics industry and the seemingly endless expansiveness of its spectacular, as well as its prosaic, applications captured public imagination during the decade 1937-46. Anticipation of its promising future focused attention on its latest developments with little appreciation of the broad foundation upon which the remarkable achievements of the decade rested.

The plastic industry recorded a phenomenal growth

statistically, although it must be recognized that it was still relatively small when compared with the major metals-producing groups. However, from relatively unimportant amounts during the period after World War I, consumption of plastics increased fairly rapidly during the decade of the 20s. In the period from 1929 to 1940, there was a 450% growth, and after 1940, production, in a large part for war purposes, almost quadrupled again.

The expansion during World War II was best indicated by a late 1945 report by the United States War Production board, which revealed a 325% increase in the 1944 dollar volume of plastics and synthetic resins over that of 1939. In 1944, materials production was in the neighbourhood of over 850,000,000 lb., and sales were at approximately \$350,000,000 as compared with a \$72,000,000 evaluation for 1939. Over the same period, finished parts produced by moulding, lamination and fabrication were valued at approximately \$310,000,000.

Figures released in the fall of 1946 by the United States tariff commission and the bureau of census showed that production of all plastic materials (during 1945) was the largest on record, amounting to 900,000,000 lb., or 50,000,000 lb. greater than 1944.

The accompanying table shows the later rate of production of some of the more important plastics and the estimated rates after expansion as compared with the base year of 1939:

Material	Rate of Production (1939 Equals 100)		
	1945	Aug., 1946	After Expansion
Phenolics (moulding)	185%	267%	334%
Cellulosics "	484	570	745
Polystyrene "	3,260	11,130	31,200
Vinyl (all uses)	1,250	1,438	3,000

Source: Plastics Materials Manufacturers' Assn.

The most outstanding advances in the use of plastics occurred in the United States and in Germany, where chemical production dominated. Great Britain, third in rank at the end of World War II, was undoubtedly accelerating its plastics output, and its research laboratories kept pace with the leaders in development of new materials and techniques. Canada, Australia and New Zealand had well-developed plastic industries, although comparatively smaller in scope. No statistics were available as to the strength of the industry in the U.S.S.R., although the large volume of technical work of high quality indicated an advanced industry. Latin American countries which, up to the close of World War II, were large users of both imported plastic end-products as well as of basic raw plastic materials, were branching into domestic manufacture of both raw and finished plastic products. Every industrial country had made strides in the use of various specific types of plastics, and the year 1946 found virtually no country, no industry, and practically no phase of life untouched by plastics—and vice versa.

Prewar Period.—The last three years of the '30s marked the advancement into full scale production of plastics introduced just a few years earlier, as well as the appearance of new materials which were to become the industry's leaders. Commercial production of polystyrene resins was announced in 1937 as the availability of the required raw materials at low enough prices justified their use. An ethyl cellulose moulding-compound made its bow that year and the first lignin plastic sheeting was manufactured.

Other additions to the cellulosic family (cellulose acetate butyrate and methyl cellulose) came in 1938. Melamine resins were introduced commercially in 1939 in the

United States and Great Britain, and were quickly utilized for heat- and arc-resistant electrical applications and for other products for which urea resins had previously been the only suitable plastic.

Vinyl butyral replaced cellulose acetate as a safety glass interlayer in 1938, and a plasticized vinyl resin calendered sheet appeared. In this same year nylon, the first all-synthetic fibre, made its appearance although actual commercial uses for hosiery, brush bristles, surgical sutures, etc., did not go into production until 1939. Vinyon, a vinyl-derived filament yarn, followed close on its heels.

In Germany, there was reported extensive use of styrene in the manufacture of "Buna" synthetic rubber as well as for chemical uses and other applications which greatly extended the use of the styrene group in that country.

Urea resins moved into moulding compounds, impregnating syrups, adhesives and lacquer constituents and in England it was used as the bonding agent for plywood boats. In France, urea resins were utilized for table tops as large as 960 sq.in. and also for large switchboards and decorative panels.

By 1939, phenol-formaldehyde products represented over 70% of the total output of moulded plastic products for camera cases, housings, corrosive-resistant apparatus, etc. Phenolics were widely used in electrical, communication, automotive and aviation industries. Laminated plastics extended the scope of their service in mechanical products as well as nonmetallic gears. Up to 1939, cast phenolic resins went principally into decorative applications such as buttons, jewellery, radio cabinets, games, etc.

Manufacture of vinylidene chloride resin was initiated late in 1939, but it was not until later that extruded fibres woven into upholstery, fishing lines, etc. showed its qualities.

Because of their remarkable optical properties and non-fragile character, methyl methacrylate resins infiltrated into the transparent media where glass products long had control—airplane windshields, lenses, highway reflectors, edgelighted signs and illuminated displays. Denture materials based on acrylate resin became widespread in the United States and England. There was great activity in the automatic moulding field, and compression moulding was speeded up to meet competition from injection moulding advocates. Eight fully automatic compression-moulding presses were introduced, and one company attempted to mechanize the transfer method. A thermoplastic injection machine which could be adapted to thermosetting materials had trial runs. Multiple unit injection-presses were used principally for steering wheels, radiator grills, automotive instrument panels and window frames.

Conversion to Wartime Uses.—Throughout the world, plastic materials were being tailored to the military form after the outbreak of World War II. As war needs expanded, the industry created entirely new materials to fit the specifications written by the armed services. Activities in Germany and German-controlled territories as reconstructed from the post-war reports of technical investigation commissions (see latter part of this article) indicated that the German plastics industry was large and self-contained, with the greatest concentration of effort on chemical development rather than on mechanical production. The availability of abundant "slave" labour no doubt obviated the need for labour-saving contrivances.

In the United States and Great Britain there was an enormous increase in plastics in 1940, to replace other

strategic materials such as metal and rubber, as military uses for plastics were then still in the embryonic stages, leaving them comparatively free for civilian products.

No really new materials appeared on the market in 1940, but an outstanding rise in volume and stature was credited especially to the vinyl ester resins and to cellulose acetate butyrate. Nylon installed itself in the industrial field as bristles for brushes used in textile printing. Vinylidene chloride was rapidly gaining influence in the high-strength fibre field. Cellulose acetate plastics of higher acetyl content (58% acetic acid) offered greater resistance to hot water and to warping at high humidities.

Production still centred around civilian items ranging from shower curtains of plasticized vinyl resin, to phenolic and urea radio cabinets (more than one-half of the sets made in 1940 used plastic housings) and extruded plastic woven into furniture upholstery replacing reed and rattan. New moulded plastic parts cropped up in innumerable industries ranging from a marine bilge pump to urea louvres for fluorescent lighting fixtures, and Christmas tree balls of cellulose acetate.

The styrenes and acrylics were close competitors in such curiously assorted production outlets as ultra-decorative transparent furniture, automotive horn buttons and aircraft enclosures. Injection-moulded brushes came out in acrylics while styrenes did an outstanding job in radio insulation, coaxial cables and dashboard accessories. Ethyl cellulose sheeting was found to be suitable for the manufacture of deep-drawn rigid transparent containers and sales displays.

The aircraft industry used plastic plywood for moulding aeroplane wings and fuselages, and small resin-bonded plywood boats (the predecessors of the famed P.T. boats) proved to be simpler and more economical to fabricate as well as vastly superior in weather resistance.

The commercial introduction in 1940 of butadiene copolymer rubbers by all major United States rubber companies culminated a decade of experimentation with various synthetic rubbers. This further pointed up the growing shortages of raw materials, some of which could be replaced by the then more available plastics. Flexible textile coatings of plasticized cellulose nitrate, vinyl, etc., supplanted rubber as waterproofing. Vinyls were found to make excellent insulating wire coverings and sturdy gaskets.

There were several outstanding military applications in gas mask parts, aircraft and helmet liners, and three British fighting services reported over 1,000 uses for synthetic resins. The British also reported the use of clear acetate sheet, first to hold glass together in windows and then to replace it after it had been blown out.

The first shortages of U.S. plastics became apparent early in 1941, when thermosetting plastics became scarce. First formaldehyde and then phenol had to be placed on a strictly mandatory basis. (Germany and Great Britain had instituted government control over the sale and use of plastics in the previous year.) In view of this situation, a great deal of effort was put forth to develop and utilize nonstrategic and extender materials. Lignin, for example, because of low cost and availability, was given special consideration. Experimental work yielded a lignin moulding composition that compared favourably with some phenolic formulations. Thermosetting materials such as furfural, soybean and bagasse formulations and others requiring small percentages of the critical formaldehyde and phenols were carefully tested.

Many improvements were reported in reinforcing agents for use with phenolic resins, most of which were signifi-

cantly directed toward boosting the toughness and impact resistance of the plastics to make them more suitable for rugged work. These developments related to the use of crepe paper, wood pulp, glass fabrics and filaments, sisal, cottonseed hulls, metal powder and mica in plastic compositions.

Resin-treated and compressed wood was moulded and fabricated into metal-forming dies and aeroplane propellers in 1941. Cast phenolics took on industrial jobs, such as forming tools in aircraft factories and parts for oil-well drilling operations.

Laminates were among the first plastics to feel the impact of the change-over to war production, since the parts produced from them were generally stronger than those from moulding materials. Many standard shapes and forms fitted directly into U.S. defense demands. Aircraft manufacturers accepted moulded, laminated and fabricated plastics for radio antenna masts, aileron-control quadrants, cabin paneling, flooring, ventilators and fluorescent instrument panels.

Urea plastics appeared in meteorological and medical applications, and a threefold increase in the number of moulded urea sockets in 1941 coincided with the expansion of fluorescent lighting.

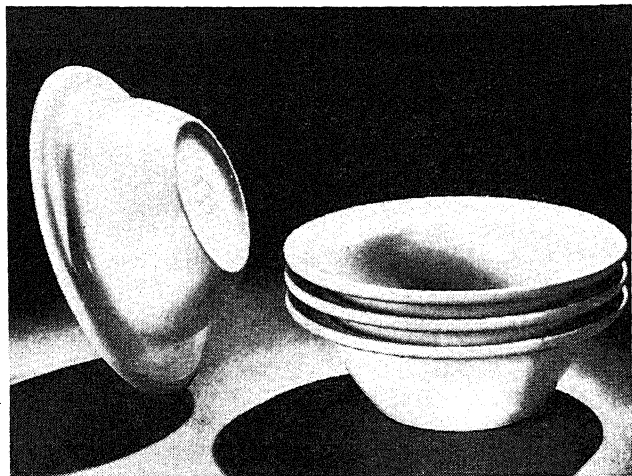
Although thermoplastics were helping to alleviate the metal shortage by replacing zinc die-cast parts, bronze, aluminum and other metal fabrications, the most extensive war use of thermoplastics was in transparent form for acrylic and acetate aircraft enclosures, light filters for blackout lights, moulded cellulosic gas mask parts, vinyl cable insulation, ethyl cellulose lacquers and coatings for shells.

Styrene was requisitioned for synthetic rubber, and the United States government authorized the building and operation of government plants to produce styrene rubber-like copolymers. New plastic materials based on styrene—Styramic and Styraloy, of especial interest in the electrical field—were the forerunners of many modified polystyrene compounds.

Other thermoplastic materials showed similar trends toward war and essential civilian needs in 1941, especially after they were classified according to end use for purposes of government control. The U.S. automotive industry continued to use large quantities, and there were over 110 plastic applications in the 1941 model. Other volume markets, the refrigeration field and vacuum cleaners, also showed a multiplicity of plastic parts. Other consumer products were table trim, light shields, weather-stripping and motion picture screens. Both ethyl cellulose and the vinyls appeared as rubber replacements for gun covers, electrical tape, raincoats, coated fabrics and footwear. Optical qualities of methyl methacrylate were stressed in lenses of all types.

Vinylidene chloride advanced with the aid of modified extrusion equipment and methods. Fibres, cordage and cane-like sections evolved into upholstery fabrics, insect screening and rope, moulded fittings, tubing and pipe to replace aluminum, copper and rubber for instrument control lines, water, oil and air lines, etc.

Some revolutionary moulding techniques were brought to light in 1941. Machines for continuous injection of thermosetting material (jet moulding) had a thorough production test. A continuous-extrusion machine for thermosetting plastics was reported, and a combination extrusion-forming machine for making hollow objects in one piece, was in full-scale production. Large-capacity injection machines produced heavier units and in automatic compression-moulding, a 25% step-up in press speed,



Plastic tableware made of heavy duty melamine-formaldehyde and scientifically designed to meet restaurant requirements was being tested for commercial as well as home uses during 1946

coupled with substantial improvements in machine design, increased output per mould cavity. Fabrication of aircraft structures by the rubber-bag moulding process was in successful operation.

In Great Britain there was a tremendous increase in the use of plastics. Some of the items reported included polyethylene cable insulation, melamine adhesives for plywood structures, "scratchproof" unbreakable polystyrene spectacle lenses, moulded urea toilet floats and cellulose acetate eye shields and flexible windows.

Scattered information on the use of plastics in Germany, in 1941, indicated a huge production of synthetic rubber, and captured German aeroplanes showed considerable use of plastic parts both clear transparent—methyl methacrylate and polystyrene—as well as moulded and laminated metal replacements.

Rapid Growth of Military Demand.—The transition from civilian to wartime status was most evident in the first six months of 1942 as the plastics industry retooled to meet military demands. The U.S. industry co-operated fully in effecting conversion of materials and facilities, and the list of plastic applications for the military machine multiplied.

Ordnance components included moulded handles for pistols, bayonets and machine guns, fuse parts, ammunition rollers and booster tubes. The quartermaster's supply room contained helmet liners, whistles, bugles, skis and raincoats. The battle fleets employed plastics in navigation instruments, wire and cable insulation, binoculars and sturdy tableware. Small landing-craft and swift patrol-boats were made of resin-bonded plywood. Goggles, wire-reinforced flexible window enclosures, parachute flare bases and stirrup pumps were among other miscellaneous war products.

The aircraft industry standardized plastics for innumerable accessories and approved antenna masts, dies for forming metal sheets, fairleads, pilot seats, radio loop housings and propellers. Plastic plywood was employed in the construction of trainers and gliders as well as for miscellaneous structural parts. Compreg wood was used where high-strength products were needed.

Research activities in surface coatings were directed toward camouflage coverings for cloth, buildings and concrete or asphalt roads. Resinous coatings as protection against weather, climate, corrosion, etc. were widely used on fabrics, metals and wood.

Because of the difficulty in obtaining equipment for

new plants, there was little activity in marketing new materials. One dramatic entry of 1942 was an allyl type resin, a thermosetting transparent resin which polymerized rapidly and was adapted to low-pressure moulding and contact-pressure laminating.

The spur of war demands extracted a number of new plastics from the chemical laboratories in 1943. Synthetic replacements for natural mica—a critical component of radio and electrical apparatus—were being developed. One of these was Polectron, which was said to have an unusual combination of low dielectric loss, high-temperature stability and superior water resistance. An inorganic mineral element, silicon, was combined with organic radicals composed of carbon and hydrogen to form a new group of plastics called silicones—suggested for use in electrical insulation where their high-heat resistance—500° F.—offered unique qualities. Adhesives called Cycleweld and Reanite, which bonded together wood, metal, plastics, ceramics, fibres and rubber, were announced. These thermosetting materials, applied to the surfaces of parts to be bonded and then cured under heat and pressure, formed light cheap structures, stronger than those produced by conventional gluing.

Reinforced plastics made possible large-volume production of low-cost, lightweight, high-strength structures and offered many advantages beyond the replacement of critical aluminum and magnesium. Several new unsaturated polyester and allyl resins, Laminac, Allymer and MR-resins were brought out from behind censorship barricades. These resins had properties which permitted them to harden at low or no pressure without costly dies and were combined with reinforcing materials such as specially developed papers, glass fibre, cotton and other fabrics to make large and economical structures formerly considered impractical for plastics.

Materials appeared in fresh guises—nylon was moulded into products of low moisture-vapour transmission; vinylidene chloride appeared as a nonflammable packaging film, and vinyl chloride-acetate rigid sheets were used in air forces navigation and calculating instruments, templates and radio transcription records for overseas service. An improved heat-resistant clear methacrylate moulding compound also appeared. Low pressure moulding, post-forming of laminates and moulding with high frequency passed rapidly through their experimental stages to become first-rate methods of plastic production.

In addition to the many standardized aircraft parts and other widely accepted uses of plastics for ammunition boxes, doors, wing and tail units, gun turrets, engine parts, etc., production in 1943 added jettison tanks, bomb racks, radar housings, barrage balloon valves and speed indicators as important aircraft applications. Resin-bonded plywood was moulded at low pressures into monocoque structures utilizing sandwich constructions comprising high-strength sheets bonded to low-density cores.

Other military applications which came to light were bomb-recorder frames, snake bite kits, insignia, hand grenades, foot tubs, training bayonets, medical supplies, walkie-talkie equipment, tank periscopes, ship propeller bearings and binocular carrying-cases.

The nonmilitary applications were highly restricted, although vinylidene chloride for piping, screening and packaging set a new course for this plastic. Vinyl resins appeared in shoe soles and flexible electric insulation. Ion exchange resins were employed in many industrial pro-

cesses for purification of water-conditioning apparatus.

Last Two Years of War.—The year 1944 was one of steady growth, with wartime arrivals fulfilling their early promise and new materials and techniques adding to the stature of plastics. Increased production of moulding powder was largely used in war matériel.

Virtually the entire production of polyethylene was channelled into wire and cable insulation where its low electrical losses, moisture impermeability and general physical and chemical characteristics established almost top rating. A remarkable high heat-resistant thermoplastic, Cerex, appeared in coil forms, condenser cases, battery jars and sterilizable surgical instruments. Styramic H. T., a styrene derivative of improved resistance with a heat distortion point of 236° F. and electrical characteristics better even than those of polystyrene, was completely absorbed for ultra-high-frequency insulation in secret war equipment. A new form of styrene product appeared—an extremely fine fibre ranging in size up to 0.002 in. in diameter. This polyfibre made possible low-pressure bag-moulding of large thermoplastic parts.

Vinyl resin dispersion in a solvent plasticizer, or mixture of solvent plasticizers, was used in paste form as a coating for cloths, forming a homogeneous, tough, elastic film.

Resorcinol-formaldehyde resins, curing rapidly at temperatures from 60° to 150° F. under nearly neutral conditions, were found advantageous for assembly-bonding of wood and other materials which were deteriorated by strong acids used in most other cold-setting urea and phenolic glues.

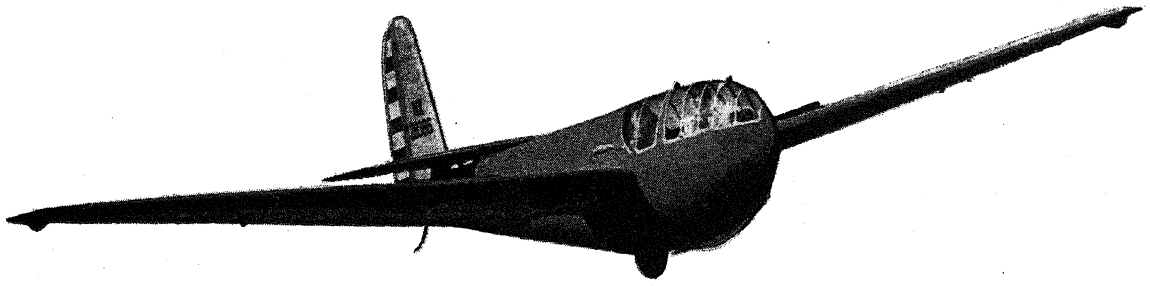
Experimental applications were developed of 100% furane resins which could be moulded, laminated, cast, sprayed as air-drying coatings and used as adhesives and impregnating agents.

During 1944, the low-pressure and so-called "contact" resins proved satisfactory for low-cost, large, compound-curved structures of great strength. One new low-pressure development was a continuous production unit for making laminates with new contact resins, from fabrics and papers of all kinds in single or multiple laminate form. These laminates proved weather and temperature resistant, and dimensionally stable.

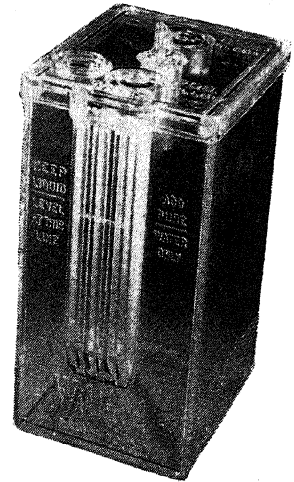
"Sandwich materials" and "expanded" or "foamed" plastics were also among the noteworthy developments of 1944. The advantages of sandwich construction involving stiff dense faces separated by thick light cores, long recognized, was augmented by sandwiches of low-density porous structures—foamed-plastic cores sealed within light metal alloys, resin-bonded plywood, laminated paper, cloth or Fiberglas surface layers. Successfully used for aircraft fuselages and buoys, they were suggested for insulation for refrigerators and prefabricated houses. Another highlight of 1944 was the adaption of the injection and extrusion moulding process to thermosetting plastic as well as to natural and synthetic rubber.

Only one new plastic appeared in 1945—Forticel, cellulose propionate. The commercial production of this plastic was made possible by the development of a new process for making propionic acid from cheap hydrocarbons obtained from natural gases and petroleum. Developments in other cellulose plastics included a flame-resistant composition, thermoplastic laminates and carboxy-methyl cellulose.

Lifting of censorship revealed improved transparent plastics for optical purposes. A plastic lens was made from polystyrene and cyclohexyl methacrylate. A new allyl ester resin (Kriston) was introduced which provided a thermosetting plastic of excellent clarity and a refractive

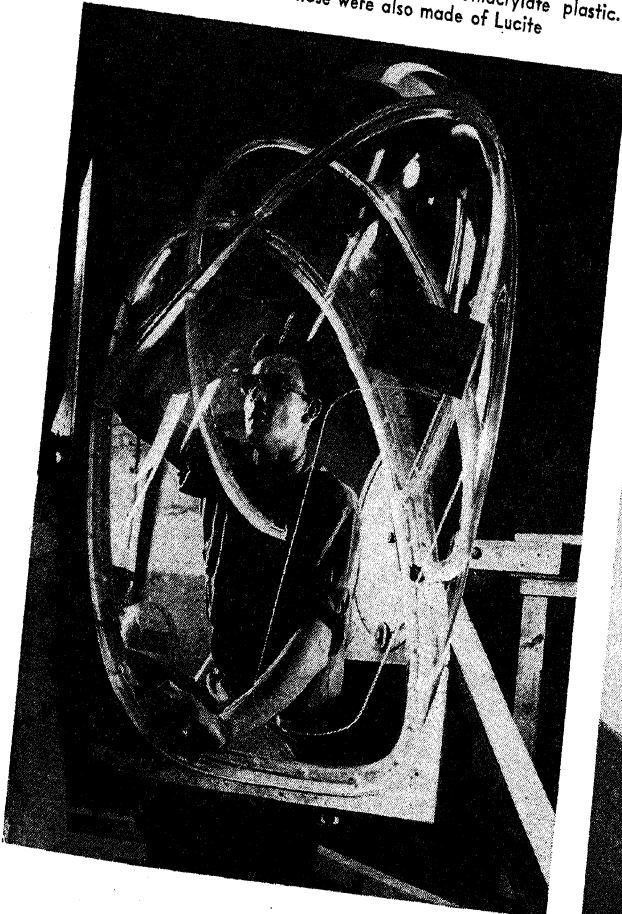


Above: Test flight of the first all-plywood plastic glider, near Los Angeles in 1942

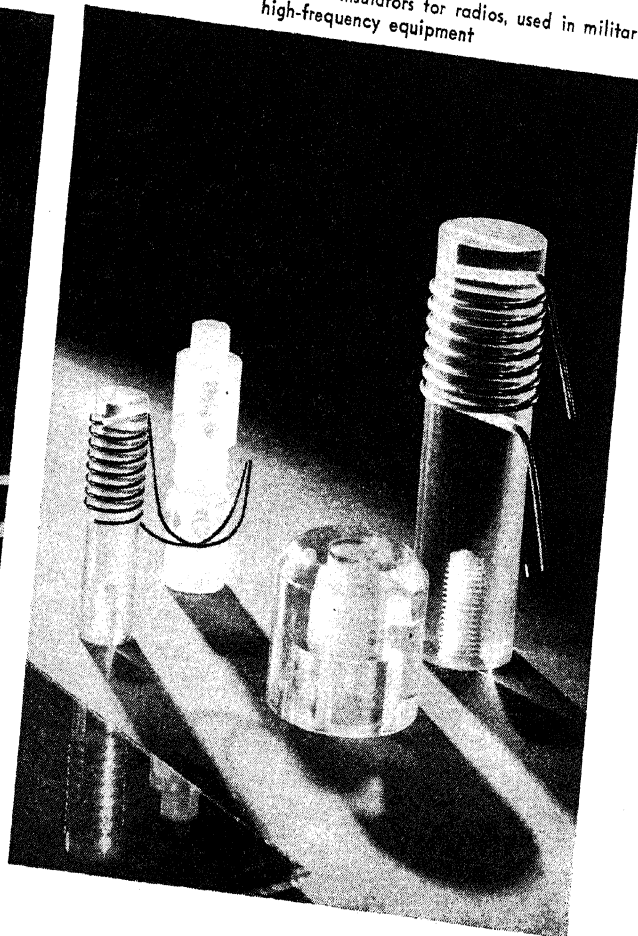


Right: Styron radio battery case for aircraft

Below: Bomber nose of Lucite, a methyl methacrylate plastic. The ribs of the nose were also made of Lucite



Below: Lucite coil forms and insulators for radios, used in military high-frequency equipment



index of 1.5483 at 28° C., higher than that of most optical glass.

Polyethylene's outstanding qualities as a high-frequency dielectric as well as its physical and chemical properties were seen in new applications including a polyethylene film for packaging purposes. The silicone family continued pre-eminent as an insulating material, both in the form of silicone rubber, baked resin coatings, impregnants for asbestos packings, and also as a treatment to make textiles, wallpaper, mirrors, etc., water repellent.

Melamine resins were applied to new use in decorative surface sheets for low-pressure laminates. Panel boards of glass fabric bonded with melamine resin provided navy ships with a fire and arc-resistant laminate of high impact strength. Phenolic-casting resins proved satisfactory in many applications, including plating shields, foundry patterns, forming dies and holding fixtures. Naturally-occurring phenolic compounds present in lignites were tested as a source of insulating materials. Lignocelluloses occurring in agricultural wastes were also used in the preparation of moulding compounds.

Wood pulp as a reinforcing filler in the formulation of tough plastics was given consideration, and wood itself, with its cellular structure relatively undisturbed, became an important addition to the reinforcing elements used in plastics. Solid wood, impregnated and moulded to shape, retained its natural beauty with resistance to water, acids, alkalies and heat, added. Wood, moulded, laminated or resin-bonded or resin-coated continued to be of interest to aircraft manufacturers.

Other types of reinforcing materials such as paper, cotton and glass fabrics continued to find new applications as did the synthetic core materials (foamed plastics) for sandwich type structures. Reconversion to civilian products focused attention on the latter for possible use in lightweight furniture, refrigerators, stoves and household insulation.

Improvements in processing and machinery fostered the expansion of plastics into many fields of use which prewar high cost had limited. Low-pressure and contact-pressure moulding and laminating continued to predominate as the outstanding opportunity for plastics growth. Electronic preheating and "hy-speed" plunger moulding helped keep conventional moulding fields from lagging too far behind. A machine which made possible the application of a combination of injection and compression-moulding techniques to thermoplastic moulding was introduced. This combination of two types of moulding retained all the advantages of injection without losing the high pressure on the plastic characteristic of compression.

The moulding of hollow articles by blowing a plastic material into shape (blow moulding) underwent radical changes and opened many possible markets for plastics in the container and ornament trades.

An innovation was frictional welding of thermoplastics. This method heated thermoplastics for welding by rubbing the two pieces together at high surface speeds and quickly applying a pressure of about 300 lb. per sq.in. for a few seconds.

The year 1945 also marked the lifting of secrecy on such important outlets for plastics as radar, the proximity fuse, rockets, protective armour for personal use, the T-44 frangible bullet, the M-74 incendiary bombs and the No. 77 smoke grenade. Other military uses included surgical instruments and dressings, prosthetic devices and impreg-

nation for map paper.

Reconversion.—Plastics were in the forefront of reconversion in 1945-46 because the industry's mechanical difficulties in changing over to civilian production were minute. The impact was evident in the textile industry, where plastics were used as synthetic fibres, for impregnation and surface treatments; in the shoe industry, where millions of pairs of plastic soles were consumed annually; in household items, and in automotive, electrical, boat and building industries to mention only a few.

By the spring of 1946, it was evident that while the total output of plastics was running almost two to one compared to 1941, the demand for most plastic products exceeded the supply by an average of three to one. In addition to the world-wide demand for civilian goods and the stimulation of accumulated savings and high wages, the plastics raw-materials producers faced pressure from a vastly expanded moulding and fabricating industry eager to meet consumer requests for plastic merchandise. Every effort was made to increase the already enlarged materials productive capacity, but the fall of 1946 found the supply situation still critical.

In spite of this basic supply problem the plastics industry continued its march toward leadership in world industry. The first national exposition of plastic products held in New York city in April 1946 displayed to the world how far plastics in general, and the United States production in particular, had advanced. Civilian applications predominated although due credit was accorded wartime accomplishments and their influence on raw materials and equipment development.

Throughout 1946, this was reflected by applications in diverse fields including industry, business, home appliances, radio, housewares, toys, fashion, home decoration, packaging, sports and innumerable others.

One of the most extensive outlets was upholstery for furniture and automobile coverings, which made use of supported and unsupported sheeting, films, coated fabrics and woven, extruded, monofilaments. Vinyl resins and their derivatives had become the leading plastic in this field because of inherent physical properties such as resistance to grease, oil, water, etc., and because of comparatively large supply. In addition to upholstery, wider markets for plastics in textiles were indicated in the use of resin impregnants to prevent shrinkage, to impart greater mould, fire and water resistance and to make colours fast.

Of particular significance in the textile field also was the extension of the comparatively new method of coating with polyvinyl chloride latex, which eliminated the use of hazardous and expensive organic solvents and the need for solvent-recovery equipment. The adaptability of these resins to the solution coating of fabrics, fibres and paper provided an important advance in combining plastics with other raw materials.

Among new materials introduced was a modified polystyrene moulding powder (Plexene), combining higher heat-resistance, greater strength, improved machining qualities and better weathering characteristics with many of the excellent properties already demonstrated by the styrene polymers.

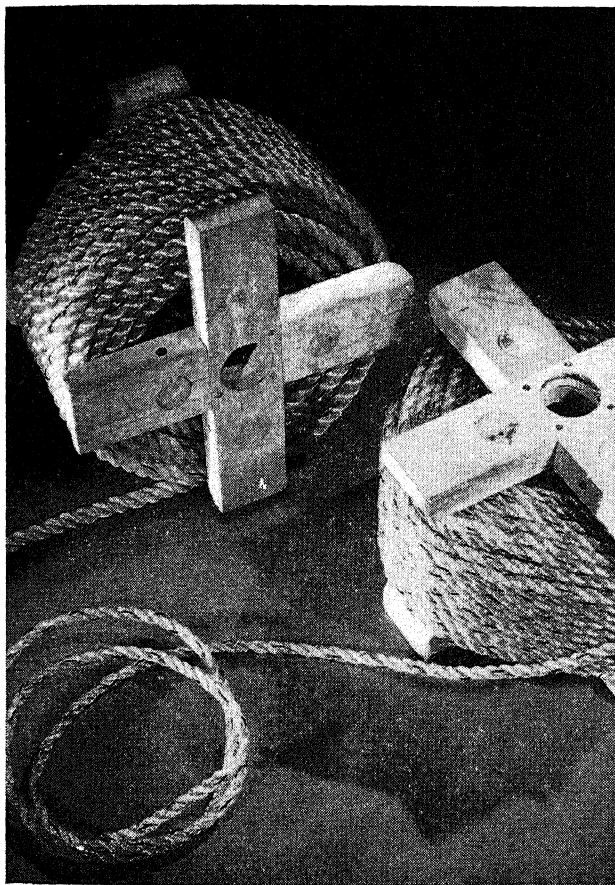
A new polyvinyl-type resin for conversion into supported or unsupported film, moulding, extruding, calendering or laminating compounds was introduced by a prominent aircraft manufacturer.

Regular production of acrylic contact-laminates on a continuous basis was achieved by a west coast manufacturer. Fabric or paper, containing colour and design, impregnated with polyester resin, was laminated to acrylic

sheet and came out of the machine ready to be formed either flat or in shapes. The material could be formed with standard dies of wood, plaster, light metal or plastic into bowls, trays, architectural panels, displays, signs, lighting fixtures, maps, etc.

A new, low-cost wood-fibre base plastic was developed (Duron) for use in trays, holders, toys, displays, furniture, etc. Composed essentially of ground wood fibres, plasticizers and other chemicals, it could be formed at high temperature and pressure into flat sheets and other shapes. The material resembled dense hard wood burl, having a mottled low-gloss surface.

A series of cold moulding compounds in brilliant, fast, opaque colours were introduced which could be cold-



Numerous marine and military uses were found for plastic rope, braided with strong filaments of Saran, during World War II

moulded automatically with no heating or after baking. These compounds could be either thermoplastic or thermosetting and could be formed cold, with or without subsequent baking, on standard hydraulic equipment.

Tetrafluoroethylene, an industrial resin with the trade name Teflon, while still in the pilot plant stage, was expected to find a place where heat endurance, unusual resistance to solvents and corrosive agents and good high-frequency insulation were required. Some of the first applications were coaxial cable spacers, gaskets, valve packings, tapes, rods and cylinders. The outstanding properties of this material were its toughness over a wide range of temperatures, its electrical properties over a wide range of frequencies, its extreme chemical inertness and its heat resistance.

Better, stronger and more economical cotton yarns were made, using a new resin impregnating process. The new method, known as Fiber-Bonding, by preventing the

slippage of one cotton fibre along another parallel fibre, was said to increase tensile strength. Conventional processes such as spinning, spooling, warping and twistings were said to be eliminated by this new method.

Structural core materials such as honeycomb core structures, low-density cellular cellulose acetate (C.C.A.), continued to receive attention for insulation and high-strength applications. Low-pressure and contact resin laminates appeared in many applications ranging from artificial legs, arch supports to decorative table tops and boats.

One aspect of the interrelation of plastics to other industries was the amalgamation of the rubber and plastics industries, principally through the addition of such plastics as the polyvinyls to the synthetic rubbers. The combinations showing the most promise were mixtures of vinyl chloride-type polymers and acrylonitrile-type synthetic rubbers. The improved product showed increased flex life, better sunlight and ozone resistance, reduced flammability, reduced creeping in light-loaded stocks and improved abrasion resistance.

Processing and machinery kept pace in 1946 in speedier, more efficient production methods. Cellulose ester plastic sheeting was produced in continuous sheet form in widths up to 24 in. by straight-line operation, using a standard extruder and several sets of rolls.

Great Britain.—Throughout World War II, Great Britain was plagued by the lack of materials, proper equipment and many other essentials for successful plant operation. Nonetheless, the British plastics industry turned out a wide variety of complex plastic parts, many of which duplicated United States articles for war and essential civilian use. There was, however, no comparison in total output.

Britain's shortages had its compensations. From them came an increased knowledge of the wide range of use to which plastics could be adapted—and the ability to substitute one plastic for another. For example, when polystyrene moulding powder (90% of which had formerly been imported from Germany and almost the whole of the remaining 10% from France) became practically nonexistent, many British wartime products were moulded of cellulose acetate or the newly developed polythene.

The scarcity and high cost of raw materials further stimulated British research in the utilization of waste fibres and low cost fillers to extend plastics. Increasing amounts of coconut shell flour were used, partly because of shortages in the supply of walnut shell flour. There was great interest in reinforcing materials, and wood waste and lignin were studied for postwar home construction and other building purposes.

Even though about 95% of British plastics production went into military goods for over six years, the industry co-operated closely with the United States in the exchange of general information and "know-how," as well as details of producing war matériel. A complete range of plastics was produced and it was probable that, with Germany out of the picture, Britain would be in second place in world plastics production.

England was somewhat behind in plastics manufacturing progress, since it could not develop the extensive mass production and exploitation of plastics that were possible in the United States because of the latter's proximity to raw materials supply. Furthermore, compared to the United States, British plastics machines were far less in number, more antiquated and smaller in capacity. In many in-

stances, wartime makeshifts were still in use at the end of 1946.

Nonetheless, the ingenuity and experience gained in war was turned to advantage in civilian products, and the industry expanded in all directions. One outstanding large-scale application of plastics was the remodelling of railway car interiors.

A widespread educational program was launched to inform both the manufacturer and public alike of the new and old materials in the ever-expanding plastics family. Extensive projects were afoot also to expand first the basic chemicals available for plastics by the formation of joint British-American companies and by the use of United States production methods. British manufacturers worked in close collaboration with U.S. suppliers of raw materials to further developments and techniques.

Prices of most plastics in Britain were from 50% to 300% higher than in the United States. This limited their use and accounted for the prewar trend to use plastics as relatively expensive materials. The advance in productive capacity and the addition of new versatile plastics plus the passage of the Anglo-American Trade and Financial agreement suggested that British plastics development would proceed on a more extensive basis and products would become more reasonable in price.

Germany.—Developments in the German plastics industry during the war period 1939–45 were surveyed by Allied investigating groups who released a series of detailed technical reports distributed by the United States department of commerce and the Canadian national research council.

Some of the new plastics described which had not been manufactured in the Allied countries were: polyurethanes, polyvinyl esters and polyethyleneimine as well as many different types of copolymers of vinyl chloride, styrene and acrylic esters. It was also revealed that Germany had developed a method of manufacturing polyvinylpyrrolidone, a polymer with the unique property of solubility in both water and organic solvents. More than 300,000 units of a 2.5% solution of this polymer were administered to German wounded as a blood substitute.

A synthesis of acrylic derivatives directly from acetylene, carbon monoxide and compound with labile hydrogen atoms was of interest as a possible factor in decreasing production costs for plastics of this type.

The general impression of the German plastics industry was that it was well advanced, particularly with regard to raw material manufacturing process and fabricating techniques other than moulding. There was a wealth of compression presses, mostly conventional, but there were no novel compression methods. In injection moulding, Germany was inferior to the Allies and used only small capacity equipment. There was considerable activity in extrusion.

In finishing, the Germans displayed some very ingenious mechanical-drill jig setups, and there were many fine examples of toolmaking.

In the field of transparent sheeting, one unique process was the formation of thin film by a stretching process using polyvinyl chloride. German methacrylate was found to be less subject to crazing than that made by the Allies, but on the other hand the German product caused trouble at high altitudes. A new forming method, known as liquid forming, utilized the force of gravity associated with hot glycerin, poured in portions of shapes during form.

In laminating, paper phenolic laminations were widely

used and to a smaller extent, cloth. The Germans tended to use laminating stock in compression moulds to form products rather than fabricate stock sheets. Plastic bearings were available in stock sizes.

Since leather was critical, three types of plastic substitutes were made—polyvinyl chloride, polyurethane and polyvinyl acetate. These were used for belts in power transmissions and large conveyors as well as for shoe soles. Expanded or porous plastics were widely used for military purposes as insulation against electricity and moisture. Foamed plastic was also used for life jackets.

While most plastics known to the Allies were in large-scale production, one exception was cellulose acetate butyrate. The Germans had not advanced in practical application of the silicone and fluorine plastics to the extent that the Allies had. Nylon was well known, although the polyurethanes, superior in ease of dyeing, competed closely with it.

The German plastics industry was based on the maximum use of soft bituminous deposits and the chemical production of bulk plastic materials was extensive.

Canada.—Five years of war gave great impetus to Canada's plastics industry although its activities were still largely confined to fabrication and the bulk of its raw materials still imported. The war forced great extensions to existing plants, brought about a vast improvement in engineering skill and manufacturing knowledge and added the names of about 40 firms to the prewar list of Canadian plastics fabricators. In 1946, there were only four or five companies producing raw materials, and the bulk of moulding powders and other raw materials continued to be imported from the United States.

Phenol-formaldehyde manufacturing facilities were expanded, and there were new plants for the manufacture of vinyls, nylon, lignin plastics and laminated paper.

During the last four years of the war, Canadian plastics fabricators produced in great quantity transparent aircraft parts by drawing, blowing and forming, and supplied complex parts for the Mosquito and Lancaster bombers.

Numerous other intricate moulded and laminated parts were developed for military purposes, including periscope housings, instrument cases, binocular parts, Sherrill compasses, No. 69 hand grenades, etc.

Other phases of the plastics industry also increased in scope—synthetic resin adhesives, extrusion, wire coating, low-pressure moulding and laminating. There was close co-operation with the plastics industry in the United States on technical matters, interchange of information and public education.

The plastics industry had a firm foundation in the dominion and, while stock mould products and proprietary items (radio parts, buttons, toys, razor sets, etc.) still led in bulk production, custom-made products were on the rise.

Australia.—Prior to World War II, there were about 70 manufacturers in Australia moulding phenolics, but the war brought about a great increase of "backyard workshops," plastics departments added to engineering firms, as well as plastics fabricators. Though quantitatively small when compared to some other Australian industries, the plastics group contained an impressive number of firms engaged in compression, injection, extrusion moulding, laminating, etc. Methods and machinery were generally up-to-date.

Except for phenolics, raw material production was inadequate, principally because of the lack of a flourishing organic chemical industry, insufficient fundamental chemicals, and practically no cheap hydroelectric power. Thus,

most raw materials were imported, although the industry carried on an active campaign to reduce the cost of chemical and other imports vital to plastics production.

Latin America.—Latin American countries had been large importers of plastics, since more than half of the countries neither manufactured plastic materials nor produced semi-finished forms of plastics. The moulding industry mushroomed in the period 1942–46, although the initial impetus came in 1937 with the importation of German injection machines and polystyrene. After World War II, new machinery was bought, particularly automatic injection, and both foreign and domestic capital encouraged domestic production.

Latin American countries producing their own plastic materials, either wholly or in part, from local raw materials in 1946 were Argentina, Brazil, Chile, Colombia and Uruguay, with Argentina leading in output. Peru, Venezuela and Cuba manufactured no raw plastics but produced some finished plastics from imported materials.

Brazil imported \$92,000 worth of U.S. plastic materials in 1944, but later a few firms in Brazil attempted to produce synthetic resins using cresylic acid as a substitute for phenol. Prior to the war, about 185 tons of phenolic resins were produced annually and alkyd and urea resins also were made to some extent, although the bulk of consumption requirements was normally met by imported prepared resins and moulding powder.

Chile, a large fabricator of plastics, imported \$221,000 worth in 1944. Her minimum annual consumption requirements were estimated at about 1,000,000 lb. The only raw material produced was casein plastic in limited quantities.

Mexico became a big importer of cellulosic plastic materials and alkyd resins as well as other raw materials from the United States, as normal annual consumption of all plastics materials was over 2,000,000 lb., including resins for the coating and plastics industry. Prior to the war, phenol-formaldehyde resins for moulding were produced, and there were postwar plans for expansion of raw materials capacity. The plastics moulding and finishing industry represented an investment of about \$10,000,000, principally in injection and compression presses.

Cuba did not produce raw materials but after 1940, the moulding and fabricating industry increased considerably, particularly concentrating on smaller products such as buttons, combs and accessories.

Colombia had only one manufacturer of plastic materials in 1946, and that firm made phenolic moulding powder for its own use. There were about eight moulders in the country, and both injection and compression techniques were used.

Uruguay remained backward in its use and production of plastics, casein being the only plastic manufactured. However, a phenolic plastics industry was under development in 1946.

Peru produced no plastic materials and very few finished plastic products, the latter, principally, buttons, novelties, etc. Other importers of plastics in extremely small quantities included Ecuador, Costa Rica and Paraguay. None of these had moulding facilities but used the materials principally in paints, coatings and some fabricated articles. (See also CHEMISTRY; CHEMURGY; ELECTRICAL INDUSTRIES; ELECTRONICS; MACHINERY AND MACHINE TOOLS; MUNITIONS OF WAR; PAINTS AND VARNISHES; RAYON AND OTHER SYNTHETIC FIBRES; RUBBER.)

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(C. A. Bx.)

Plastic Surgery

See SURGERY.

Platinum Group Metals

Palladium, iridium, osmium, rhodium and ruthenium are so closely associated with platinum that world production must be reported as a group. Table I includes all of the leading producers except the U.S.S.R., where the unreported output was variously estimated at 100,000 to 150,000 oz. annually. A number of minor producers had outputs varying from a few ounces to a few thousand.

Table I.—World Production of Platinum Group Metals
(Fine oz.)

	1937	1939	1941	1942	1943	1945
Canada, total	259,206	284,304	221,749	507,801	345,717	317,600
Platinum*	139,377	148,902	124,317	285,228	219,713	162,000
O.P.M.†	119,829	135,402	97,432	222,573	126,004	155,600
Colombia‡	29,315	39,070	37,349	49,163	39,961	35,129
South Africa§	39,625	59,311	85,730	73,255	58,890	65,000
United States	21,505	41,160	32,730	33,044	37,552	31,046

World Total (est.)|| 476,000 543,000 483,000 773,000 619,000 ?

*Platinum content of nickel refinery residues, plus a small amount of crude.

†Other platinum metals, mostly palladium.

‡Crude.

§Crude from ores and concentrates; ordinarily the total is increased about 10% by recoveries of osmium in gold mining.

||Total crude and refined.

Previous to 1914, the Russian output constituted 90% or more of the world total, but the industry became so disorganized during World War I and the subsequent revolution that it did not regain its former level. During the late 1920s and early 1930s the soviet share varied widely, but averaged about half of the total. Then Canada developed into a heavy producer, and apparently was in the lead most of the time, but with the soviet output

Table II.—Platinum Group Metals in the United States
(Fine oz.)

	1937	1939	1941	1943	1945
Production, total	21,505	41,160	32,730	37,552	31,046
Crude	10,927	32,526	26,236	27,162	26,551
Refined	4,761	5,270	1,805	5,205	1,068
O.P.M.	5,817	3,364	4,689	5,185	3,427
Imports, total	206,937	306,627	309,995	362,251	383,298
Crude	86,743	122,204	244,849	263,893	172,029
Refined	62,066	68,022	9,865	41,272	72,849
O.P.M.	58,128	116,401	55,281	57,086	138,420
Exports, total	59,567	46,329	18,853	3,267	24,638
Supply, platinum					
Refinery output	36,174	36,033	98,376	234,320	162,032
Secondary	55,926	45,432	37,522	68,613	58,942
Imports, refined	62,052	68,022	9,865	41,272	72,849
Total	154,152	149,487	145,763	344,205	293,823
Stocks	60,236	71,393	150,887	176,560	138,839
Sales, total	95,951	100,266	190,075	344,719	336,851
Chemical	18,300	20,306	68,285	131,716	115,186
Electrical	9,465	11,952	28,368	185,281	107,260
Dental	11,115	13,753	19,426	27,044	30,871
Jewellery	49,848	47,385	66,151	438	81,305
Others	7,223	6,808	7,845	240	1,599
Supply, palladium					
Refinery output	5,945	3,491	49,812	82,411	28,649
Secondary	12,680	13,039	12,630	23,616	32,968
Imports	45,427	96,829	46,099	43,874	118,270
Total	64,052	113,359	108,541	149,901	179,887
Stocks	21,942	29,273	138,014	104,372	119,757
Sales, total	69,570	51,406	78,904	137,709	185,232
Chemical	170	468	3,342	14,162	8,988
Electrical	20,854	21,510	35,456	25,907	69,300
Dental	40,214	22,989	31,440	41,522	42,259
Jewellery	8,277	5,899	7,999	45,218	56,578
Others	55	540	667	10,900	8,107

unreported the exact status could not be determined. The United States did not become a producer of appreciable importance until 1938. Salient statistics relating to the platinum group metals in the United States are presented in Table II.

The United States had never been a heavy producer of platinum, but after 1938 was able to supply about 10% of its needs. The remainder of the supply was imported, mainly from Canada, either directly or after going through the refinery in England; the U.S. also received practically all of the Colombian crude, and up to 1943 received moderate amounts of the soviet output.

Figures in Table II emphasize the increase in demand during World War II, but even more strongly the shifts in uses that followed the development of war demands. The use of platinum was barred in jewellery, formerly the heaviest consumer; the chemical industry showed the earliest response to war demand, and while appreciable expansion did not come in the electrical industry until later, the peak was higher, so that in 1943 the electrical industry absorbed 54% of the total sales, as compared with 38% in the chemical industry, and 8% in dental and surgical uses. Postwar demand developed so markedly that the price of platinum rose from \$35 beginning in May 1946, to \$90 in October, declining to \$70 in November.

The uses of platinum are too numerous to list in detail, but some of those that contributed most directly to the war program were: contacts for a wide variety of electrical equipment; detonator fuses; electronic tubes for radio communication and radar; spark plug electrodes; parts for bomb sights and computing devices for remote control of machine guns; catalyst in the production of nitric and sulphuric acids; spinnerets and bushings for rayon and glass fibres; and electrodes in a number of electrolytic operations.

Palladium went through a transition that in some ways was even more spectacular than that of platinum, as the relative increase in demand was greater, largely because palladium was used to a greater extent than ever before as a substitute for platinum, as well as for its own specific uses. The demand in dentistry, already well established as the largest use of palladium, saw little change, the bulk of the increase being divided between electrical uses and jewellery, largely as a substitute for platinum.

It is to be noted that while the sales of platinum in 1945 were slightly less than in 1943, the sales of palladium were 35% greater, with sharp increases in both electrical and jewellery uses. In fact, the consumption of both platinum and palladium in 1945 were record high figures.

(G. A. Ro.)

Pla y Deniel, Enrico

Cardinal. Pla y Deniel (1876–), Spanish prelate, was born Dec. 17, 1876, at Barcelona, Spain. He was ordained at Rome in 1900 and was a professor in the seminary of Barcelona until his consecration as bishop of Avila. Transferred to the diocese of Salamanca in 1935, he was elevated to the primatial see of Toledo in 1941.

Msgr. Pla y Deniel was active in social welfare and worked for the betterment of the working classes. Under the republic, he was subjected to adverse demonstrations, but the president, a socialist, had publicly announced his admiration for the prelate, then Bishop of Avila.

On Sept. 2, 1945, he issued a pastoral letter which endorsed the regime of Gen. Franco, but denied that the Catholic Church favoured totalitarianism. "We affirm

solemnly that the church in Spain has kept perfect neutrality," the primate's letter said.

He was named to the College of Cardinals, Dec. 23, 1945, and was created and proclaimed cardinal at the consistory on Feb. 18, 1946.

Plums

See FRUIT.

Plutonium

See ATOMIC BOMB; CHEMISTRY.

Pneumonia

For some time prior to the beginning of the eventful decade 1937–46, there had appeared a decidedly downward trend in the mortality rate from pneumonia in the United States. The causes of this trend were not known, but it was probably related to the general improvement in the health, welfare and medical care of the population, as evidenced by the similar but less striking trend in the death rates from all causes and particularly in those from tuberculosis. The accompanying table shows the death rates for an average of more than 20,000,000 policy holders of the Metropolitan Life Insurance company and for more than 7,000,000 inhabitants of New York city. The major drop in death rates from pneumonia was not the result of a reduction in the incidence of the disease. It occurred in some years in spite of an actual increase in the incidence of the disease and it began before the advent of effective curative agents.

Death Rates from All Causes and from Pulmonary Tuberculosis, and Pneumonia (All Forms) 1930–45
Deaths per 100,000

Year	Industrial Policy Holders*			New York City†		
	All Causes	Tuberculosis, respiratory	Pneumonia (all forms)	All Causes	Tuberculosis, pulmonary	Pneumonia (all forms)
1930	873.5	70.4	75.7	1,080	64.2	116.1
1931	877.0	67.2	73.7	1,100	62.5	132.3
1932	851.9	61.8	65.4	1,050	56.8	111.3
1933	860.0	57.8	62.5	1,050	57.3	108.6
1934	854.1	52.2	65.0	1,050	55.5	94.8
1935	837.6	49.8	61.1	1,030	55.4	89.1
1936	839.8	48.5	69.8	1,070	57.8	90.8
1937	822.5	46.7	66.9	1,060	54.2	89.6
1938	766.6	42.1	50.6	1,000	47.7	64.9
1939	760.0	40.6	42.8	1,020	47.6	57.6
1940	760.9	40.2	35.5	1,020	44.5	45.7
1941	744.4	38.9	20.5	990	44.8	45.0
1942	728.4‡	37.6	29.2	1,000	42.6	39.0
1943	764.1	36.3	35.1	1,090	43.8	50.6
1944	754.6	35.7	33.1	1,030	42.3	45.2
1945	738.0	33.3	26.7	1,030	41.5	39.4

*Statistical Bulletin, Metropolitan Life Insurance company.

†Quart. Bull., Dept. Health, City of New York. The published death rates for "All Causes" are given per 1,000 and are here changed to conform with the others. The last figure, therefore, is not significant.

‡Figures for 1942–45 inclusive are corrected by exclusion of "war deaths."

That the widespread use of sulfonamide drugs and, later, of penicillin markedly affected the mortality from pneumonia could not be doubted. Evidence on this point came from several sources. Large general hospitals reported case-fatality rates of one-half to one-third or even less when compared with the mortality from the disease in the pre-sulfonamide era. The first evidence of a reduction in the death rate on a large scale came from the native labourers in the South African gold mines. Among them pneumonia was always a major cause of death and disability. Data from these areas were especially reliable since all employees were given prompt medical attention for all illnesses and continuous studies of the disease had been carried on for a number of years. In one group of gold fields in the Witwatersrand, where an average of about 300,000 native labourers were employed, the incidence of pneumonia during the years 1934–39, inclusive, remained fairly constant, between 25 and 30 per 1,000. During the years 1934–37, the case-fatality rates also stayed quite steady, between 10.0% and 11.2%. This mortality

dropped sharply to 3.08% for the year beginning Oct. 1, 1938, which was the first year when an effective sulfonamide drug—sulfapyridine—was employed. In a survey among industrial employees carrying group health and life insurance, the average case-fatality rate from pneumonia for the pre-sulfonamide years, 1935–37, was 20.8% as compared with 3.9% during the period from Jan. 1939 through May 1942, when effective sulfonamides were available and were widely used. Even more striking reductions in mortality from pneumonia were observed in the armed forces of the United States during World War II as compared with World War I. In one large naval hospital, 1,265 consecutive cases of pneumonia were observed and treated during a four-month period in 1945 without a single death.

Tremendous forward strides were made in the field of antibacterial therapy during the decade. These advances fell into three distinct categories: (1) immunotherapy, *i.e.*, specific serum therapy; (2) chemotherapy, which includes chiefly the sulfonamide drugs, and (3) antibiotic therapy, mainly with penicillin and streptomycin. Except in the case of streptomycin, the results obtained with these successive forms of treatment were progressively better, and their beneficial effects were about as striking in pneumonia as in any other infectious diseases. Since these were curative forms of therapy and were in varying degrees specific in their action, they effected a progressive drop in the case-fatality rate from pneumonia in proportion to the range of their effectiveness against the different causative organisms.

Serum Treatment.—The first serious attempt at serum therapy of pneumonia was made possible in 1912, after it was discovered that the pneumococcus consists of a group of related organisms which could be separated into specific types. The three most common types were readily identified. During and immediately after World War I, minor successes were achieved in the development of type I antipneumococcus serum in horses, and some cases caused by this organism were treated. The results, however, were not brilliant; the treatment was cumbersome, large volumes of horse serum had to be given intravenously and untoward reactions were frequent and severe. The identification of the pneumococcus obtained from the patient was laborious and time-consuming, and the efficacy of treatment diminished rapidly as the disease progressed.

Up to 1937, progress was along the lines of improving the serum treatment. New methods of concentrating and refining antipneumococcus horse serums resulted in more potent preparations which were easier to administer and caused fewer reactions. Meanwhile, many additional types of pneumococci were recognized although only a few of them proved important as a cause of pneumonia. It then became possible to influence additional types of pneumococci and the scope of this form of treatment increased. Methods were also developed for rapid typing, including direct typing of pneumococci from sputum. Specific serum could then be given earlier in the disease, and its effectiveness was thereby increased.

Serum treatment reached its peak in 1937 and 1938 with the use of antipneumococcus serums prepared in rabbits. Small volumes of highly concentrated and refined rabbit serums proved much more effective than larger volumes of horse serums, and fewer reactions were encountered. Furthermore, it was possible to prepare such serum against all types of pneumococci. At about this time, public interest in the serum treatment of pneumonia increased. In Massachusetts, with the co-operation of the department of health, diagnostic facilities had been made available for

prompt typing throughout the state, and serums were provided for treatment without cost. Several other states soon followed suit and this form of therapy was increasing in popularity just at the time when the sulfonamide drugs made their appearance.

Treatment by Chemicals.—Up to this time very little progress had been made in the use of chemicals for the treatment of pneumonia. Some derivatives of quinine had proved effective in the test tube, but were too toxic in the doses required for therapy. One derivative, hydroxyethylapocupreine, gave encouraging results in pneumococcal pneumonias and received a limited trial in Pittsburgh, but proved less effective than sulfapyridine.

In 1937, sulfanilamide was first generally used against haemolytic streptococcal infections. During the next four or five years new derivatives of this chemical were introduced which were considerably more effective and less toxic. Cases of pneumonia caused by a haemolytic streptococcus were successfully treated with sulfanilamide, but this compound proved only slightly effective against the pneumococcus. Reports appeared of successful treatment in cases of type III pneumococcus pneumonia which previously proved refractory to serum therapy. Occasional cures in cases of meningitis caused by this and other types of pneumococci were also reported for the first time with the use of sulfanilamide, both with and without specific antisera. Serum alone and all other forms of treatment proved ineffective in pneumococcal meningitis, which up to this time was a universally fatal disease.

In 1938, the first important derivative of sulfanilamide—sulfapyridine—was introduced in England under the trade symbol M. & B. 693. This compound was highly effective against all types of pneumococci and at least as effective as sulfanilamide against haemolytic streptococci and other bacteria. The sharp reduction in the case fatality rate which resulted from its use in pneumonia has already been mentioned.

Sulfapyridine, however, gave serious side reactions which frequently made it difficult to tolerate and sometimes necessitated its discontinuance before a full therapeutic effect was achieved. Most frequent was the severe nausea and vomiting which often made it impossible to continue the medication by mouth. A soluble sodium salt was then introduced which permitted administration by injection, but did not alleviate the symptoms. Because of its poor solubility and because it is excreted almost quantitatively in the urine, sulfapyridine tended to produce kidney damage through precipitation of the crystals and this was accentuated through loss of fluids caused by vomiting. Other toxic reactions such as fever, rash and serious effects on the blood were observed after more prolonged treatment. Serums were still used to some extent in suitable cases either to supplement the sulfapyridine or when the latter could not be tolerated.

Sulfathiazole and sulfadiazine were introduced during the following two years and proved to be much less toxic and considerably more effective in the pneumonias caused by pneumococcus and haemolytic streptococcus. They were also more effective than the earlier compounds in cases of staphylococcal pneumonia, but had little if any effect in pneumonias caused by such less common organisms as Friedländer bacillus and influenza bacillus. Renal complications and other toxic effects were less frequent than with sulfapyridine. Some patients, however, could not tolerate even these newer drugs and others developed a sensitivity to them so that their continued administration,

or subsequent treatment with them, when required, was accompanied by severe reactions. Sensitization was most frequent with sulfathiazole.

Other sulfonamide compounds were also introduced, but sulfadiazine remained the drug of choice in the treatment of pneumonia both from the point of view of its efficacy and its relatively low toxicity. Others, particularly sulfathiazole and sulfamerazine, were used to some extent. The latter is a monomethyl derivative of sulfadiazine which is rapidly absorbed, but more slowly excreted than sulfadiazine and can therefore be given at less frequent intervals. Sulfadiazine and sulfathiazole proved much more effective than specific antiserums, their use involved much less trouble and expense and they gave fewer reactions. Furthermore, since the sulfa drugs were about equally effective against all types of pneumococci, typing prior to treatment was no longer essential and this procedure, though valuable for other reasons, was largely discarded.

Penicillin and Streptomycin.—Penicillin was first introduced for limited clinical trials during the latter half of World War II, and became available for general use after the middle of 1945. In the pneumonias, its range of effectiveness largely overlapped that of the latest sulfa drugs. The results in cases of pneumococcal pneumonia were comparable with both agents. Penicillin may be slightly more effective than the sulfa drugs in streptococcal pneumonias, but it proved to be much more effective in staphylococcal pneumonias. The latter require treatment with larger doses and for longer periods than those used for pneumococcal pneumonias.

Penicillin was found to be essentially devoid of serious untoward effects and thus had a great advantage over the sulfa drugs. Unlike the latter, which were usually given by mouth, penicillin should be given by injection in order to be certain of obtaining its full therapeutic effect. Oral penicillin proved effective in cases of pneumonia when given in much larger doses and at more frequent intervals than those used for injection. The oral method, however, could not be relied upon in the most serious cases. Penicillin could be given to persons who did not tolerate the sulfa drugs because of sensitivity or because of kidney disease. In patients with heart disease in whom fluids must be restricted, penicillin proved advantageous since large amounts of water must be given with the sulfa drugs in order to avoid kidney complications, whereas penicillin, which is also excreted largely through the kidney, was better retained and, therefore, more effective because of restricted fluids.

Various combinations of antisera, sulfonamides and penicillin were tried in pneumococcal pneumonias. There was little to choose between penicillin and sulfa drugs in the great majority of these cases. Fever and symptoms subsided and the process in the lungs cleared in about the same time with each of these agents. However, serious complications such as empyema of the pleura were somewhat less frequent with penicillin treatment and yielded to local treatment with this antibiotic more readily than with sulfonamides, so that operations for drainage were more often avoided. In the severest cases, particularly in aged persons with other complicating diseases, penicillin seemed to have the greatest advantage and probably saved more lives than the sulfa drugs. The combination of penicillin with sulfadiazine was the most effective in the pneumococcal pneumonias. Specific antipneumococcal sera as an adjuvant to either penicillin or the sulfa drugs proved much less useful in reducing the death rates.

Another effective antibiotic was streptomycin. This agent was found to be active in the test tube against many bacteria which were not affected by penicillin. Among those which may cause pneumonia are the Friedländer's bacillus and influenza bacillus. A few cases of pneumonia caused by these organisms were treated with streptomycin, and most of the results were favourable. This antibiotic, however, proved to be not quite so free of untoward effects as penicillin and it was also much less effective. Furthermore, organisms originally sensitive to this agent often became resistant quite rapidly during the course of treatment. This phenomenon of "fastness" acquired during therapy was observed only very rarely with the sulfa drugs or with penicillin.

Failures to obtain satisfactory cures in cases of bacterial pneumonia became much less frequent but they were still encountered at the end of the decade. Among the chief causes of these failures were: (1) the presence of other serious diseases, (2) delay in the institution of treatment until irreversible changes had taken place in the structure or function of the tissues, (3) the development and progression of complications not affected by the treatment, (4) causative organisms which are resistant to the action of the antibacterial agents or which become resistant during treatment, and (5) secondary infections with resistant strains.

Prevention.—Some progress in the prevention of pneumonia was also made during the ten years. In the earliest attempts among the native labourers in the South African goldfields and in the United States army in World War I, the use of vaccines made from whole organisms and incorporating the most prevalent type of pneumococci resulted in some reduction in the pneumonias caused by those types. The incidence and mortality from pneumonia as a whole, however, was influenced only slightly. In 1929, it was shown that the purified capsular carbohydrate of the pneumococcus which is responsible for its type specificity was by itself capable of stimulating antibodies against the corresponding type of pneumococcus. The results of one large experiment with immunization by the injection of the specific carbohydrates of types I and II pneumococci were published in 1938, and suggested that some protection was obtained. Localized institutional outbreaks of types I and II pneumococcal pneumonia were brought to an abrupt end by the use of vaccines prepared from the whole organisms or by the type specific carbohydrates of the same types. Later, immunization with a single injection of the capsular polysaccharide fraction of pneumococci of four common types was shown to have some effect in preventing pneumonias caused by these types. The carrier rates for the same types were also reduced in the immunized group. Pneumonias due to other types, however, were not prevented.

Attempts to prevent pneumonia by the continuous administration of small doses of the sulfa drugs given to large groups of individuals did not prove to be effective. The spread of sulfonamide-resistant strains of streptococci and outbreaks of infections with these strains were reported where such prophylaxis was widely used. The development and spread of resistant strains of pneumococci in a small group of institutionalized patients who were subjected to sulfadiazine prophylaxis was also observed. There were no reports on the use of penicillin as a prophylactic.

All the methods of prophylaxis and therapy emphasized the importance of the causative organism in pneumonia. Previously, the pneumonias were classified on clinico-anatomical grounds as either lobar pneumonia or bronchopneumonia. The use of serum emphasized the im-

portance of recognizing the pneumococcal pneumonias and of determining the "type." Chemo and antibacterial therapy caused a shift in emphasis so that the diagnosis of the species of bacterium causing the disease and the susceptibility of the strain to the antibacterial agents became of primary importance in management. Because the determination of the causative organism and its susceptibility to antibacterial agents required considerable delay, treatment was usually started on the basis of the clinical findings and then altered as indicated when the results of the laboratory tests became available.

A nation-wide study of the bacterial aetiology of the pneumonias was undertaken during a two-year period ending Sept. 30, 1940, and covered over 30,000 patients. This survey showed that three-fourths of all the pneumonias were caused by pneumococci and that three-fourths of the pneumococcal pneumonias were caused by ten common types of pneumococci. Streptococci and staphylococci together accounted for about 6% of the cases. Friedlaender bacilli and influenza bacilli were equally prevalent, but together accounted for only 0.3% of the cases. No significant bacterial agent was recorded in about one-sixth of all the cases. This study, however, was made with methods which were designed to reveal the pneumococci and their types and emphasized the occurrence of these organisms. It probably did not represent the true picture since pneumococci may be identified in the throat and sputum even when they play no significant part in the causation of the pneumonia.

Nonbacterial Pneumonias.—During the decade, the failure of large numbers of cases of pneumonia to respond to any form of antibacterial therapy brought to the fore still another group of pneumonias, those caused by nonbacterial agents, including filterable viruses and rickettsias. There had previously been indirect evidence that such nonbacterial agents could produce pneumonia, particularly as part of systemic diseases. In 1930, however, the virus of psittacosis was discovered and was definitely identified as the cause of "parrot fever," a disease acquired from sick parrots and having as an outstanding feature an atypical pneumonia. Many viruses related to that of psittacosis were later identified as the cause of disease or as normal inhabitants of various animals and birds and from some of the latter, infection was transmitted to humans. Infected pigeons in particular were implicated as a source of a few cases of so-called "ornithosis" in humans. Small outbreaks of pneumonia caused by other related viruses were reported from Illinois and from the Bayou regions in Louisiana. Still others were identified as a cause of pneumonia in cats and may have been transmitted from these animals to humans. Only occasional strains of these viruses proved susceptible to the sulfa drugs or to antibiotics.

The viruses of influenza may also cause pneumonia. The agent which caused the influenza epidemic of 1918 was not known, but pneumonia was an outstanding cause of death during that pandemic. Haemolytic streptococci, the influenza bacillus of Pfeiffer, pneumococci and staphylococci were found, and one or another of these bacteria predominated in the pneumonias that complicated the influenza in different localities, but occasional cases were described in which no pathogenic bacteria could be found after careful search.

With the discovery of a virus in influenza in 1933, and the recognition of types A and B influenza viruses as the cause of most of the influenza outbreaks after that time, it was shown that these viruses alone can produce pneumonia in animals and in man. In most susceptible ani-

mals, the virus of influenza alone under proper conditions produces extensive and fatal pneumonia. In the swine, however, it was found necessary to have a combination of an influenza virus and a strain of influenza bacillus to produce pneumonia. The virus alone produced an upper respiratory tract infection with systemic symptoms similar to uncomplicated influenza in humans while the influenza bacillus alone produced no illness. In man, occasional cases of extensive and even fatal pneumonias caused by influenza virus have been recognized in which no significant bacteria were found. Fatal cases of pneumonia were proved to be due to the virus of lymphocytic choriomeningitis and some were thought to be caused by the viruses of chicken pox and measles.

The rickettsias which cause typhus fever and other diseases may produce pneumonia in severe cases. A disease called Q fever (for Queensland in Australia where it was first recognized) was shown to be caused by a new rickettsial agent. The disease as first described was similar to severe influenza, but the same agent was also found in the southwestern United States and in central Europe, where it gave rise to severe forms of pneumonia. The rickettsia of Q fever was found in various wild and domestic animals and was isolated from ticks and the insects which probably serve as vectors. Sporadic cases caused by this agent were recognized in Montana and Wyoming, and outbreaks of Q fever occurred among laboratory workers in the United States and Australia and among troops in Italy, the Balkans and in southern United States. The sulfa drugs and antibiotics were found to have no effect in this disease or in any of the other virus or rickettsial pneumonias except when they were complicated by infection with susceptible bacteria. All of the known viruses and rickettsias together, however, accounted for only an insignificant part of the cases commonly diagnosed as virus pneumonia.

Finally, a large group of cases of pneumonia was recognized in which none of the pathogenic bacteria, viruses or rickettsias could be implicated. These cases occurred mostly in adolescents or young adults, had all the characteristics of virus diseases, and were called "virus pneumonia." In the U.S. army they were labeled "primary atypical pneumonia of unknown aetiology." They probably represent a group of diseases with a characteristic clinical course of varying severity, the more severe ones resembling psittacosis. A few fatal cases were reported, and the pathological picture resembled that of other virus infections. Two distinctive features were recognized in many cases. The serum in many cases was found to develop the property of agglutinating human red blood cells of all groups in the cold (cold agglutinins). In some of the same cases and in certain others, the serum also developed the property of agglutinating certain strains of nonhaemolytic streptococci. These cases likewise failed to respond to the sulfa drugs and to antibiotics unless they were complicated by susceptible bacteria.

The virus nature of this disease was proved by direct experiment. The disease was transmitted to human volunteers by the use of filtered and unfiltered sputums obtained from cases, but not by boiled sputum. Attempts to transmit the agent to animals with similar materials usually failed. Many virus agents were isolated in animals inoculated with such materials from human cases, but in most instances it turned out that these viruses originated in the animals themselves and were propagated during the subsequent passages. In the case of only one of these viruses was

584 proof of its relationship to the human diseases brought forth, but this still lacked adequate confirmation at the end of the decade. (See also X-RAY.)

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Pneumonitis

See X-RAY.

Poetry

The chief event in the field of poetry in England and in America during the earlier part of the 20th century had been the appearance of a group of remarkably gifted American poets, who for the first time in history were able to challenge and even surpass the English on their own ground. Up to that time, apart from the achievement of Edgar Allan Poe, Walt Whitman and Emily Dickinson, no U.S. poet had anything of the technical mastery or the intensive power of the Victorians: Alfred Tennyson, Matthew Arnold, Robert Browning, Algernon Swinburne, Dante Gabriel Rossetti, William Morris, George Meredith or Thomas Hardy.

About 1915, the picture had begun to change. Such poets as E. A. Robinson, Edgar Lee Masters, Robert Frost, Carl Sandburg, Vachel Lindsay, Edna Millay, Elinor Wylie, Lola Ridge or Amy Lowell were sure to be ranked in literary history as being more important and vital for the growth of poetry written in English than any of the group known as the Georgians, who so largely dominated the English scene up to 1930. Two years before that date, Thomas Hardy died; and it was then seen by the discerning that only one figure in England was important, the profoundly Irish William Butler Yeats, whose work marked the end of a great tradition rather than the beginning of a new one, though he himself had been, since 1918, in many ways the link between the older generation and the new. Yeats died early in 1939, working up to the last on poems which recall in their mingling of sharp irony, old mythology and classical grandeur of utterance something of the power of Walter Savage

Landor. The rediscovery of Landor, along with that of John Donne and the later Elizabethans and 17th century metaphysical poets, was destined largely to influence all poetry written in England during the eventful decade 1937–46.

The American group mentioned above were, from the outset, committed to the business of exploiting the possibilities of an untried tradition, breaking new ground in both subject matter and form in order to achieve it. In the swift development of what was sometimes called "the poetic renaissance" in America, many other figures besides those mentioned arose, some of them destined to die young. Such, for example, was the case with Hart Crane, whose career was brief and tortured; his most ambitious effort, "The Bridge," a poem attempting to span the significance of American life and history and of Crane's own part as an actor in both, was an impressive but not always fused blend of Christopher Marlowe, Whitman, Herman Melville and of Crane's own personal genius. Crane committed suicide in 1932, but left behind others whose careers were to imply a longer, steadier effort. Such were the New Jersey physician, William Carlos Williams, whose first book had appeared back in 1913; Wallace Stevens, born in 1879 but not publishing a volume till 1923; and Marianne Moore.

Almost the last important American poet to claim wider attention than serious poets can usually get in their lifetimes was the Californian Robinson Jeffers. His *Roan Stallion*, *Tamar* and *Other Poems* had been a sensation of 1923–24. Jeffers' position in regard to the later cross-currents of poetry in both England and in America was unique. In the face of the prevailing drift which had been either toward a poetry more elaborately symbolic, more intellectualized and more mystical, or toward a poetry more informed, by social protest, more political and more violently satirical, Jeffers maintained his complete fatalism as regards politics, and a scepticism amounting to indifference as regards Christianity. His anti-democratic, non-human philosophy (derived possibly from the Greek and Roman Stoics via Nietzsche), his tragic vision of human existence, his pantheism, all set him apart. He remained a powerful poet with no followers; he blended something of his predecessor Edwin Arlington Robinson's irony with an even deeper sense of human tragedy. His fine translation of Euripides' "Medea" showed that he was at heart far more akin to the ancient Greeks than almost any poet of the decade 1937–46.

As early as 1922, the American-born T.S. Eliot had emerged from his self-chosen expatriation in London to create an unforgettable symbol of postwar disillusionment and disintegration, in the famous "Waste Land." Alone among the Americans who had gone overseas in the period 1908–18, Eliot was well equipped to deal with some neglected aspects of the English poetic tradition. As a critic no less than a poet, he found such aspects in Donne, in John Webster and in the metaphysical school of the 17th century, as well as in their successor, John Dryden. To these he added as influences on his own poetry, Dante Alighieri, Dante Gabriel Rossetti and William Morris, and the Frenchmen, Charles Baudelaire and Stéphane Mallarmé. The elements derivable from Jules Laforgue which had appeared in his earliest work soon vanished; and his conversion to the Anglican church reflowered around 1930 in the beautifully organized and musically constructed "Ash Wednesday." Because of his seemingly unflinching technical power, Eliot became the largest single influence in the whole field of poetry, as practised in England. Even those who disagreed with his position or philosophic

grounds were obliged to yield tribute to such ability as was shown in "Four Quartets." His influence in America, being less pervasive, was less decisive; but it persisted.

Oxford Group.—Not having developed primarily under the shadow of the Victorian tradition, but being able as an American expatriate to make whatever use he could of it, Eliot had an advantage over many of the younger generation in England, who were obliged to deal with that heritage at first hand. Such was the case with a small group which began to develop around Oxford in the mid-1920s. The lead which Eliot, with his harshly ascetic realism and his bitter disillusion with his own times, gave them was decisive in producing their break from the pastoralism, the idyllic romanticism of the Georgian group. They saw fit to ignore, for the time being, Eliot's preoccupation with theology as well as the Toryism of his politics. They turned, under his influence, to a poetry which was ironic in regard to the Victorian past, violently partisan in regard to the political present, revolutionary in the Marxian sense in regard to the future.

This group, consisting of Cecil Day-Lewis (born 1904) Wystan Hugh Auden and Louis MacNeice (both born 1907), and Stephen Spender (born 1909) may be said to have ruled the course of English poetry from 1930 to 1940. They succeeded in relegating to the background the individual, less socially conscious effort of the Anglo-Irish Robert Graves, who as early as the 1920s had tried to turn the current of Georgianism into something more realistic and more intellectually satisfying. They completely obscured the work of the South African Roy Campbell, whose best poems showed the influence of Arthur Rimbaud and the great French symbolist Paul Valéry, and whose finest work appeared around 1925-30. But they were unable to quench the talent—also originally more French than English, and in the first instance owing much to Paul Verlaine, Rimbaud, Donne and Alexander Pope—of Edith Sitwell, whom some critics regarded as England's greatest poet. Miss Sitwell, as early as 1929-30, had moved rather sharply away from the glittering artificialities and the wordplay of her earlier poems into a realm of social satire, and of social protest of her own. The first important work of this period in her development was "Gold Coast Customs," a poem which curiously recalled in its rhythms the American Vachel Lindsay, and, in its symbolism, William Blake and Christopher Smart. Later in her "Street Songs" and "Green Song and Other Poems" she brilliantly established herself as an important voice of the years of World War II. Her work was uneven, still over-clogged with detail; but at its best, it was uniquely poignant in the feeling of compassion and indignation aroused in her by the spectacle of her time.

Neither Day-Lewis nor Auden nor MacNeice could be said to be so completely convincing a poet as Miss Sitwell proved herself to be in her best poems; nor did Miss Sitwell reach the point of acknowledged mastery attained by Yeats in his latter years. Perhaps the Oxford group took up, when young, too many political causes; perhaps it was too insistent in arguing for the rights of the Spanish Loyalists or the Chinese in their struggle with Japan (one of the group made a special trip to China to witness the Chinese-Japanese war, and emerged with some sonnets that were clever but not quite convincing enough). In 1939, with England again drifting into war with Germany, Auden, the acknowledged leader of the whole group, migrated to the United States and became an American citizen. He attempted to repeat, for America's benefit, the success Eliot had in London in the late 1920s, by stressing his apparent conversion to Christianity in such works as

"The Double Man" and "For the Time Being." Unfortunately, Auden, with his worldly cleverness, his sheer fertility of invention, his interest in Freudian psychology and modern psychiatry, was the reverse of a religious poet. He merely further confused some important details of the American poetic scene, without resolving them in his own work.

Day-Lewis, MacNeice and Spender remained in England; but of them all, only Stephen Spender showed the possibilities of organic growth. The other two were largely content to repeat, in a key becoming more and more minor, their earliest and best poems. Spender, on the other hand, after carrying his left-wing political and social protest as far as anyone possibly could, suddenly reversed himself and became absorbed in the poetry of the great German, Rainer Maria Rilke (who died in 1926). Rilke as a poet was completely disinterested in any political theme; but as a visionary of the interior life he was the rival, if not the unique superior of the far more fragmentary and earlier Novalis (Friedrich von Hardenberg) and Friedrich Hölderlin. The preoccupation with Rilke, whom Spender ably translated, strengthened and made Spender's own poetry more purposeful.

In addition to certain young poets whose careers were cut short, such as Sydney Keyes and Alun Lewis, the years of World War II certainly produced a remarkable flowering of young poetical talent in England—and also in Wales, Australia and Canada. Scotland had previously been heard from, in the long interval between the two world wars, in such poets as the savagely left-wing Hugh MacDiarmid (whose best work was in Scots dialect) and in the more urbane Edwin Muir (whose work was written in English). The revival in Wales was most important, inasmuch as it produced a vividly lyrical poet, Dylan Thomas, whose poetry displayed a vitality in the handling of language and an intensity of emotion rare in any age. He had a rival in the person of Vernon Watkins, and an opponent of more introspective cast in David Gascoyne. Meantime, certain figures who had emerged from World War I had quietly maintained their positions. This was notably the case with Herbert Read, who was no less important as critic than as poet, and did distinguished work in both world wars.

No Recessional.—In America, despite a complete lapse in public interest, the revival had by no means spent itself at the end of the decade 1937-46. The Fugitive-Agrarian group which centred around Nashville during the period 1924-30, and which came most directly under the Eliot influence, had either dispersed itself or given up writing poetry. Its former leader, John Crowe Ransom, whose work had both irony and charm, had written almost no poetry since 1929; he was too much absorbed in criticism to be able to return to it. Its most brilliant exponent, Allen Tate, continued to write, from time to time, poems that blended Baudelaire, Hart Crane and Eliot; but his lack of facility, his sheer violence of statement, tended to drive him into silence. Robert Penn Warren, the youngest of the group, achieved only a Pyrrhic victory with his "Selected Poems" and the long and not too-convincing "Ballad of Billie Potts," before turning away to his highly successful novel *All the King's Men*. A great number of minor talents appeared elsewhere, stimulated by such college contests as the Hopwood awards at the University of Michigan, or the Yale Series of Younger Poets, which discovered such authentic poets as James Agee, Frances Frost and Muriel Ruykeyser. But in

the main, what came out of American poetry was the work (often done in obscurity) of certain strong and persistent talents.

World War II brought into prominence (as it had every right to do) the work of certain poets whose motives were largely patriotic. Poetry with openly avowed patriotic intentions had not been written in France since the days of Victor Hugo. In England it had lapsed around 1900-10, the best examples being found in Rudyard Kipling and Alfred Noyes. John Masefield was perhaps an exception; but his patriotic poems were surely inferior to "Reynard the Fox" or "Dauber." In the United States, this kind of poetry was most brilliantly written by Stephen Vincent Benét, who died in 1944, and whose two main works, "John Brown's Body" and the unfinished "Western Star" stood foremost in what may be called the field of the American epic. Benét, however, was anticipated by the now forgotten Donald Davidson of Tennessee, whose "Tall Men," published a year before "John Brown's Body," is still worth reading; he was followed—more or less successfully—by such poets as Paul Engle (who apparently abandoned the field), Norman Roston, and a few others. The attempt to transform himself from a sophisticated and aesthetic poet into a mouthpiece of patriotism effectively destroyed Archibald MacLeish's best qualities; it brought to a close the talent of Edna Millay; and it produced such monstrosities of bad taste as Russell Davenport's "My Country" and Norman Corwin's radio broadcasts. It did not seem that this field, despite the preference of many critics for it, was capable of further growth.

More vital to the course of American poetry were the works of Horace Gregory, who, in his "Chorus for Survival" seasoned his patriotism with an appropriate feeling for irony. With his wife Marya Zaturenska (herself a lyricist of distinction) he was the author of the only history of American Poetry covering the ground of the important years 1900-40. More vital, in a lesser sense, was the persistent unflinching voice of Mark Van Doren, critic and anthologist as well as poet (though far more academic than Gregory), who began his writing soon after World War I. More important, and tremendously exciting, was the work of E. E. Cummings, who conducted his unique exploration into the resources of the language with brilliant results, from the day his first poems appeared, around 1920. Considerably more vital was the later, and almost equally experimental Kenneth Fearing, who produced poems of unforgettable poignance in an idiom derived from the city streets, the slums, the industrial quarters of the United States. Vital too, was the indefatigable anthologizing carried on by the modern-minded Oscar Williams; and also the writing of many other young poets, including Karl Shapiro, who was awarded the Pulitzer prize.

But it was upon the older poets, rather than on the younger (though many of the latter showed high promise) that America's fame as a land rich in poetry securely rested at the end of the decade. Nothing was more remarkable in the history of the decade than the persistence with which certain older American poets continued to produce fine and individual work in the teeth of complete public indifference and lack of critical discrimination, and despite reviewers who were academically reactionary, violently left-wing or snobbishly intellectual in their outlook. Thirty years before, the world was just beginning to wonder about the "new poetry" coming out of America. Now wonder gave way to praise before massive achievement.

Five Examples.—Conrad Aiken, born in Savannah, Ga., in 1889, published his first books about the same time as those of Robinson, Frost, Masters, Lindsay, Sandburg, were marking the opening of the American poetry renaissance. In his later poems—"Brownstone Eclogues," "The Soldier" and the fine elegy dedicated to the memory of President Franklin D. Roosevelt, "Crepe Myrtle"—Aiken showed himself to be a poet with a superb ear for tone and rhythm, as well as a philosophic mind of far more importance than his earliest works seemed to promise. His attitude, equally modern but far less dogmatic than that of Eliot, took off from a profound study of psychology as well as a considerable knowledge of history; it derived from an experience which kept him moving back and forth across the Atlantic, between England and America. More akin to the scepticism of Michel de Montaigne in his interest for free enquiry, than to Søren Kierkegaard's desperate attempt to salvage theological dogma, his work after the outbreak of World War II failed to command the attention of the critics; and his extremely personal idiom left him without important followers. His work, however, was to be reckoned with, in a large way, in any history of American poetry in the 20th century.

H. D. (Hilda Doolittle), three years older than Aiken, and also an expatriate American, had been silent for a considerable number of years. Under the pressure of the blitzkrieg of German bombers on London, she produced in 1942-44 her wartime trilogy "The Walls Do Not Fall," "Tribute to the Angels" and "The Flowering of the Rod." This work moves from the ruins of London to ancient Egypt (in part the poem was a reminiscence of a trip to Egypt in 1939); then it traces what may be called man's higher beliefs, from Osiris and Isis to Joseph and the Madonna. It is a poem of religious significance, not bound to time and place, but deriving from the atmosphere of horror and wreckage amid which it sprang, culminating in the extraordinarily lovely poetry describing the visit of the Magi, in its third section.

Wallace Stevens, approaching 70 and as reticent as ever concerning his personal life and the sources of his poetry, went on producing book after book which revealed that under the surface of his polished and urbane irony, there moved a deeply speculative mind, more and more concerned with the human motives governing man. One of his later books, "Parts of a World" (1942), dealing with the background of World War II, was on the whole his best. His detached point of view and subtle wit precluded his achieving wide popularity, but he remained one of the most markedly individual and intellectually rewarding poets of the era.

William Carlos Williams, born in 1883, crowned a long, hard-working career as poet and physician by producing the first book of a long, philosophic poem entitled *Paterson*, the climax of all his achievements. No one in the United States surpassed him in his integrity of utterance, or had a point of view more firm-rooted in the homely actuality and the real "American grain" of his poetry. Very few had his delicacy and sharpness of feeling concerning his own background. In *Paterson*, he symbolized an entire locality and discussed vividly the inhabitants' manifest inability to grasp or describe it; he summarized vividly his own development within its framework.

Marianne Moore (born 1887), whose influence as editor upon the poetry printed by the famous magazine *The Dial* (1920-29) had been so marked, published "What Are Years" in 1941 and "Nevertheless" in 1944, which definitely established her talent as one of the most important in America. Many readers were repelled, perhaps, by the ap-

parent artificiality of her form; but all could not fail to note her vivid eye for detail, the daring and resource she employed in the assembling of her poems. Deliberately intellectual and speculative rather than emotional, she produced during World War II her "In Distrust of Merits," that had great emotional impact. Her work seemed almost certain to outlast the time. Elizabeth Bishop, in her "North and South," largely modelled herself on Miss Moore, but had a sense of form more in conformity with poetic tradition. Her poetry, like Miss Moore's, was keen and witty—with occasional emotional overtones.

(See also AMERICAN LITERATURE; BELGIAN LITERATURE; BOOK PUBLISHING; CANADIAN LITERATURE; CENTRAL EUROPEAN AND BALKAN LITERATURE; CHILDREN'S BOOKS; ENGLISH LITERATURE; FRENCH LITERATURE; GERMAN LITERATURE; ITALIAN LITERATURE; LITERARY PRIZES; PORTUGUESE LITERATURE; PULITZER PRIZES; RUSSIAN LITERATURE; SCANDINAVIAN LITERATURE; SPANISH-AMERICAN LITERATURE; SPANISH LITERATURE.)

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Poison Gas

See CHEMICAL WARFARE.

Poland

A republic in northeastern Europe, Poland is bounded by the U.S.S.R. in the E. and Germany in the W., the Baltic sea in the N. and Czechoslovakia in the S.

Area: Sept. 1, 1939 (including 349 sq.mi. for Cieszyn and 85 sq.mi. for Czadca, Orawa and Jaworzyna), 150,486 sq.mi.; Sept. 1, 1945 (after the Tripartite Berlin conference decision of Aug. 2, 1945, on the provisional Polish-German frontier, and the Moscow treaty of Aug. 16, 1945, fixing the new Polish-soviet frontier, but without Cieszyn, Czadca, Orawa and Jaworzyna), 119,703 sq.mi. In the east Poland lost 69,469 sq.mi.; in the west (if the new frontier were recognized by the peace conference) it stood to gain 39,120 sq.mi. Population: (1931 census) 31,927,733; (est. Sept. 1, 1939) 35,339,000; (Feb. 14, 1946 census) 23,911,172. Mother-tongue (1939 est.): Polish 24,388,000 (69%), Ukrainian and Ruthene 5,290,000 (15%), Yiddish and Hebrew 2,916,000 (8.2%), White-Ruthenian or Byelorussian 1,527,000 (4.3%), German 803,000 (2.3%), Russian 155,000 (0.4%), Czech 107,000 (0.3%), others 61,000 (0.2%). Religion (1939 est.): Roman Catholic 22,919,000 (64.9%), Greek Orthodox 4,253,000 (12%), Greek Catholic or Uniate 3,634,000 (10.3%), Jewish 3,351,000 (9.5%), Protestant 952,000 (2.7%), others 230,000 (0.6%).

The enormous shifting westward caused Poland a loss in population of c. 10,772,000 in the east including about 3,900,000 Poles; the recovered lands in the west—former German territories and the free city of Danzig—had in 1939 a population of c. 8,300,000 including about 1,000,000 Poles; the 1946 census disclosed there a population of 5,012,126, but a tremendous migratory movement went on afterward: 1,289,193 Germans left Poland from Feb. to Sept. 1946; c. 1,500,000 Poles coming from former Polish eastern provinces or from soviet deportation camps took their place; other Poles (986,578 up to July 31, 1946) were repatriated from Germany, Austria and western Europe; finally, up to July 1, 1946, 515,998 Ukrainians, Byelorussians and Lithuanians left Poland to settle in the respective soviet republics.

Chief towns (first figure est. Jan. 1, 1939; second figure

est. Sept. 1, 1946): Warsaw (cap., 1,289,000; 522,945); Lodz (672,000; 596,000); Cracow (259,000; 305,000); Poznan (272,000; 268,000); Katowice (134,000; 128,000); Lublin (122,000; 99,000); Gdynia (120,000; 79,000); two major cities—Lwow (Lviv) (318,000) and Wilno (Vilnius) (209,000)—no longer belonged to Poland, but among the cities recovered in the west were: Wroclaw (Breslau) (625,000; 168,000); Gdansk (Danzig) (235,000; 118,000) and Szczecin (Stettin) (272,000; 103,000).

Presidents of republic: Ignacy Mościcki, elected June 1, 1926, re-elected May 8, 1933, resigned at Kutu, on the Rumanian frontier, on Sept. 17, 1939. Wladyslaw Raczkiewicz assumed office in Paris on Sept. 30, 1939; after the French capitulation, he arrived in London on June 21, 1940; ceased his official functions on July 5, 1945, when the governments of Great Britain and the United States formally recognized the Russian-sponsored provisional government of Poland with Boleslaw Bierut as acting president of the republic.

Prime ministers: Gen. Felicjan Slawoj-Skladkowski (May 16, 1936–Sept. 17, 1939); Gen. Wladyslaw Sikorski (Sept. 30, 1939, until his death in an aircraft crash at Gibraltar on July 4, 1943); Wladyslaw Mikolajczyk (July 14, 1943–Nov. 24, 1944); Tomasz Arciszewski (Nov. 29, 1944–July 5, 1945). The Russian-sponsored government for Poland emerged first in Moscow, on March 1, 1943, as the Union of Polish Patriots; on June 22, 1944, in Chelm, a Polish Committee of National Liberation started its activity as a "provisional executive authority"; on Dec. 31, 1944, at Lublin, it transformed itself into a provisional government with Edward Osobka-Morawski as prime minister; on June 28, 1945, in Warsaw, this government was reconstructed by admitting five representatives of the Polish Peasant party headed by Stanislaw Mikolajczyk as deputy prime minister. (X.)

Struggle for Pilsudski's Mantle.—The last few years before World War II were taken up in Poland with the struggle for the succession to Marshal Jozef Pilsudski, who had virtually ruled the country from his *coup d'état* on May 12, 1926, until his death on May 12, 1935, but left no successor. The struggle for Pilsudski's heritage was fought out among the various factions of the late marshal's own followers. Protagonists in this contest were Ignacy Mościcki, president of the republic, Marshal Edward Smigly-Rydz, chief inspector of the army, and Col. Walery Slawek, chief of the so-called "colonels' group" and a personal friend of Pilsudski's.

In 1936 Rydz and Mościcki had arrived at an agreement, and on May 15 they formed a government under Gen. Felicjan Slawoj-Skladkowski which proclaimed Rydz "second citizen in the country" with precedence over the government. This act, which was contrary to the new constitution of 1935, established a kind of duumvirate. In an attempt to gain a hold on public opinion, a political bloc of government supporters was formed in Feb. 1937 with Col. Adam Koc as its chief. The bloc was called the National Unity Camp (O.Z.N. or *Oboz Zjednoczenia Narodowego*). On Feb. 20, Koc published a manifesto outlining the party's political and social program which, however, was devoid of any consistent political thought. All the other political parties maintained their opposition to the O.Z.N., and the peasants proclaimed in Aug. 1937 a ten-day protest strike, withholding supplies from the towns.

After a few months, at Mościcki's request, Koc was dismissed as chief of the O.Z.N. Public opinion and the

political parties, however, remained hostile to the new movement. The duumvirate, Mościcki-Rydz and the O.Z.N., also met with opposition from parliament and Slawek, its recently elected marshal (speaker). On Sept. 13, 1938, Mościcki unexpectedly dissolved the *Sejm* (parliament) and elections were held on Nov. 6 according to the new electoral law of 1935, which enabled the government to influence the *Sejm*. The political parties boycotted the elections, and 33% of the electorate refrained from voting; but with the help of the civil servants the government supporters won an overwhelming victory—the O.Z.N. had 161 of the 208 seats. The electoral law thus turned against Slawek, its author. Faced with political and personal disaster, Slawek committed suicide on April 12, 1939. Meanwhile political life in Poland was developing far from favourably. Anti-Semitic outbursts by young nationalist extremists, whom the government failed to keep in check, violence by army officers against the opponents of the regime and the establishment of an internment camp at Bereza Kartuska, where men were held without trial—all added to the unpopularity of the Pilsudski faction, which now could rely only on the support of the civil servants and army.

Opposition to the regime grew both on the left and on the right. The political parties differed in program but were brought together by their dislike of the regime. Foremost among them was the Polish Peasant party (P.S.L. or *Polskie Stronnictwo Ludowe*). Its great leader Wincenty Witos had since 1930 lived in exile, but he had left behind in Poland several able lieutenants, notably the former speaker of the *Sejm*, Maciej Rataj, Stanislaw Kot and Stanislaw Mikolajczyk, chairman of the Farmers' union in the Poznan province. The P.S.L., unquestionably the largest of the political parties, championed not only peasant interests but also free elections and the rights and liberties of all citizens. In foreign policy it advocated agreement with the western powers, particularly France. The Polish Socialist party (P.P.S. or *Polska Partja Socjalistyczna*), which had a strong patriotic flavour, closely co-operated with the P.S.L.; at one time it supported Pilsudski whom it had helped to power, but after the 1926 coup the Socialists went into opposition. To the right of the P.S.L. was the National party (S.N. or *Stronnictwo Narodowe*), founded by Roman Dmowski at the beginning of the century. Like the P.S.L., the National party favoured a *rapprochement* with France; indeed, during World War I it openly sided with the Allies.

In Oct. 1937, a new Christian Democratic party was formed; it was called Party of Work (S.P. or *Stronnictwo Pracy*). Its leaders were, first, Wojciech Korfanty and, later, Gen. Jozef Haller and Karol Popiel. Ignace Jan Paderewski, great artist and great patriot, and Gen. Wladyslaw Sikorski, author of military books warning against the German danger, who had been retired many years previously, joined hands with the opposition in criticizing the foreign policy of the government. The critics of the regime and government, however, exercised considerable restraint in view of the growing foreign menace to the country. It was only after World War II had started, when Poland was overrun by the Germans and the government and high command had moved abroad, that the Pilsudski regime collapsed, and the opposition parties assumed the reins of power at home and in exile.

German-Russian Vise.—Poland's foreign policy during the interwar years was an attempt at maintaining the balance between the two neighbours who might threaten

its independence. This policy, which might have been justified while both these powers were still militarily weak, continued unchanged but with diminishing success when each neighbour was far stronger than the young Polish state. Poland tried to strengthen its position *vis-à-vis* Germany and Russia by concluding an alliance with France (Feb. 19, 1921), by knitting closer ties with Rumania and the Baltic states and by giving full support to the League of Nations. Poland was indeed a valuable ally to the French at a time when Russia was only a weak countercheck to Germany, but it ceased to be an asset to France when both Russia and Germany had become powerful. Moreover, the French feared that they might become entangled in Polish-German disputes.

After his accession to power, Hitler indicated that he was prepared to reach an understanding with the Polish government. He made several approaches to Poland through different channels, but the first one was made before his accession to power through the intermediary of the high commissioner of the League of Nations in Danzig, Count Manfredi Gravina (an Italian). In these the question of Danzig and the so-called Corridor was dismissed as of secondary importance, and efforts were made to arouse Poland's interest in the east, especially in the Ukraine. At that time the Polish government saw clearly that it could no longer count on the support of the western powers, among whom pacifism and a policy of appeasement were making headway. On Jan. 26, 1934, a joint German-Polish declaration was signed. It eliminated the application of force in any dispute between the two countries for a period of ten years. In the five years following the signature of the pact the Germans reiterated their desire for friendly relations with Poland and carefully refrained from raising the question of the statute of Danzig and the Corridor, while dwelling on what they called the growing Russian menace. In this, however, they failed to gain Poland's ear.

Simultaneously, under the smoke screen of friendly talks and assurances, the reich government began to organize the German minority in Poland and liquidate Polish political rights in the free city of Danzig, and attempted to make Poland's foreign trade subservient to Germany's. Indeed, during 1936 and 1937, Germany managed virtually to abolish Polish rights and safeguards in the free city. Germany did this without changing its statute but merely by incorporating the political party organization in Danzig into that of the reich, placing the city under a gauleiter appointed by Hitler and by abolishing, with Poland's consent, the League of Nations guarantees, on which Polish rights in Danzig were based.

Polish-soviet relations were based on the peace treaty of March 18, 1921, which determined the Polish-soviet frontier, and on the nonaggression pact signed in Moscow on July 25, 1932, in which both countries undertook to refrain from the use of force to settle disputes for a period of three years. Poland, together with Russia's other neighbours, signed a convention for the definition of the aggressor in London on July 3, 1933. The duration of the Polish-soviet nonaggression pact was, on May 5, 1934, extended until Dec. 31, 1945. Although many clauses of the 1921 peace treaty, notably those on reparations, had not been fulfilled by the U.S.S.R., relations between the two countries remained peaceful.

The year 1937 and the first three-quarters of 1938 saw no fundamental change in Poland's relations with Germany or the soviet union. The nazification of Danzig was completed; but in his speeches of Sept. 26 and Oct. 9, 1938, Hitler acknowledged Poland's right to a sea



Polish Jews were prohibited from appearing without yellow triangles sewed on the backs of their coats as marks of identification during the German occupation

outlet and contrasted the Polish-German agreement with what he called the "worthless guarantee of the League of Nations." The Polish foreign minister, Col. Jozef Beck, in a circular of Nov. 9, 1937, told the Polish diplomatic missions abroad that he had no intention of joining the anticomintern bloc. The real aims of Beck's policy remained a subject of controversy, but many believed that he tried to maintain the balance between Germany and Russia for a while. Under pressure from Hitler, Beck made concessions, but to reassure Polish public opinion, which resented any concessions in favour of Germany, he sought to gain compensations from his policy of *rapprochement* with Germany.

During 1938 Germany's growing power cast a shadow across Polish policy. After the *anschluss* of Austria (March 12, 1938) Beck sent an ultimatum to Lithuania, demanding resumption of diplomatic relations. This was a countermeasure against the encirclement of Poland by the new frontiers of the greater German reich. After Hitler's diplomatic victory at Munich (Sept. 29, 1938), Poland occupied Cieszyn (Teschen) and several districts beyond the Olza. It had a strong claim to these territories on nationality grounds, but the method Beck employed to realize them by taking advantage of the tragic plight of the kindred Czech nation caused indignation among all sensible Poles and alienated public opinion in the west. Making use of Germany's powerful political and strategic position, Joachim von Ribbentrop in a talk with Ambassador Jozef Lipski put forward for the first time on Oct. 24, 1938, a demand for the incorporation of Danzig in Germany and for the construction of an extraterritorial motor road and railway line across Polish Pomorze to link East Prussia with the rest of the reich.

The German occupation of Bohemia and Moravia (March 15, 1939), the establishment of a Slovak protectorate (March 18) and the annexation of Memel (March 22) completed the encirclement of Poland. Germany renewed its demand for Danzig and the motor highway, but on March 27 it was again rejected by the Polish government. The German threat of aggression against Poland became more and more real; it was now clear that Beck's policy toward Germany had come to grief. In the house of commons, Neville Chamberlain, prime minister, declared on March 31, 1939, that if Poland's independence

were threatened the British government "would feel themselves bound at once to lend the Polish government all support in their power." A joint Anglo-Polish communiqué containing assurances of mutual help in the event of aggression against either country was issued on April 6, 1939. Poland's understanding with the west evoked violent reaction in Berlin. On April 28 Hitler denounced the Polish-German declaration of nonaggression of 1934 and the Anglo-German naval agreement. From that moment Polish-German diplomatic talks ceased and German acts of provocation in Danzig increased.

War and Partition of Poland.—On Aug. 24 a German-soviet non-aggression pact was signed in Moscow by Ribbentrop and Vyacheslav Molotov. The pact contained a secret protocol which assigned to the two signatories spheres of interest in Poland, the Baltic states and Rumania. Paragraph 2 of this document stated: "In the event of a territorial and political transformation of the territories belonging to the Polish state the spheres of interest of Germany and the U.S.S.R. will be delimited approximately by the Narew-Vistula-San line. The question whether, in the interest of both parties, the maintenance of an independent Polish state will be considered desirable, will be definitely decided only in the course of the further development of political events. In any case, both governments will solve this question by a friendly understanding."¹

War became inevitable. On Aug. 29, 1939, the German government put forward through Sir Neville Henderson, the British ambassador in Berlin, a demand in the nature of an ultimatum that a Polish plenipotentiary with wide powers should present himself in Berlin within 24 hours to hear and at once accept German terms. Poland learned of these terms from the German radio in the evening of Aug. 31. A few hours later, at dawn on Sept. 1, 1939, German armed forces without declaration of war attacked Polish territory. The preponderance of the forces which Germany was able to use against Poland on its eastern front was overwhelming (*see* WORLD WAR II). This campaign abounded in heroic attempts to halt the German invader. The last line of defense was planned to run around Warsaw and then through eastern and southeastern Poland. All plans were frustrated, however, on Sept. 17 when the soviet forces crossed into Poland at points along the whole Polish-soviet frontier between the Dvina in the north and

¹To the author's knowledge the authenticity of this document had been neither denied nor admitted by the soviet government up to the end of 1946.



Civilian Poles being led blindfolded to their execution by German military police, according to the photographer who smuggled the picture out of Poland in 1941

the Dniester in the south. On the following day the Polish government and the high command moved into Rumania; this ended the period of organized warfare.

On Sept. 28, 1939, Germany and the U.S.S.R. concluded in Moscow an agreement on the partition of Poland. Germany occupied 72,866 sq.mi., i.e., 48.4% of Polish territory, with a population of 22,100,000 people, while the U.S.S.R. occupied 77,620 sq.mi., on which 13,200,000 people lived. The Polish territories annexed by the U.S.S.R. were incorporated into the soviet republics of Ukraine, Byelorussia and Lithuania.

Poland under German Occupation.—Approximately half the territory occupied by the Germans, with a population of 10,600,000, was incorporated in the German reich. It formed the provinces *Westpreussen*, *Posen* (later renamed *Wartheland*) and *Schlesien*. The rest of German-held Poland became a *Generalgouvernement* with Cracow as the seat of a purely German administration headed by Hans Frank. In Poland the Germans found neither Quislings nor collaborators. Soon after the German attack on the U.S.S.R. the whole of Poland fell under German rule. A new district (eastern Galicia) was added to the *Generalgouvernement* while other Polish eastern provinces were divided as follows: Volhynia and Podolia became one of the *Generalbezirke* of the German-administered Ukraine; the Bialystok area was annexed to East Prussia; the Wilno area was allocated to the *Generalbezirk Litauen* and the Nowogrodek area to the *Generalbezirk Weissrussland*—both belonging to the reich commissariat *Ostland*.

The German occupation of Poland was marked by unparalleled and scientifically organized savagery hardly to be conceived by civilized people who did not witness it. Even the crimes revealed during the Nuernberg trial gave only a faint idea of what went on in Poland. It was estimated that more than 6,000,000 people, of whom almost half were Jews, were killed. The Germans had launched their total war to create a new living space for themselves. To this end a large section of the Polish people was to have been systematically exterminated, while the rest, deprived of its educated classes and national traditions, was to have been turned into a slave caste deprived of any voice of its own.

To oppose the powerful destructive machinery of the occupying forces, a well-organized underground movement was developed inside the country. Directly or indirectly the whole nation, men and women and even children, joined in. The movement took its directives from the Polish government-in-exile, which also approved major decisions and appointed local underground leaders. The fact that the headquarters of the resistance was outside the country safeguarded the movement against disorganization through discovery. Resistance to the Germans, terrorism and sabotage and the preparation of an administration to take over immediately after the war were the main objects of the movement in Poland. The underground army, numbering about 250,000, was organized in military fashion.

The Government and the Army in Exile.—While Poland was being overrun by German and Russian troops and the Polish government was interned in Rumania, a group of Polish political leaders formed a new government in France at the end of Sept. 1939. Headed by Gen. Wladyslaw Sikorski, it was composed mainly of representatives of the former opposition parties, i.e., the National, Christian-Democrat, Peasant and Socialist parties, with a few prominent men of no party. Pres. Ignacy Mościcki resigned in favour of Wladyslaw Racziewicz, previously *voyevode* (governor) of Polish Pomorze. This new government was first recognized by the French and British governments and later by other governments. It derived its authority from the constitution of 1935, which gave the president wide powers; but Racziewicz gave an undertaking to exercise some of them only after consultation with the prime minister. The new government obtained French and British loans to carry on. The main tasks of the government were to maintain the legal continuity of the Polish state, reorganize the armed forces, establish contact with the country and direct the underground movement, uphold Polish interests abroad and care for the many refugees dispersed throughout the world. A national council was called under Ignace Paderewski (from 1941 under Prof. Stanislaw Grab-ski) as a token parliament. The Polish government first established its headquarters in Paris and then at Angers in France.

A new army was formed from the remnants of the Polish forces crossing into Rumania and Hungary after the September campaign, from Poles who had previously settled in France and from the trickle of men escaping from Poland. This army in France reached a strength of 67,000 men. A large portion of the Polish navy and mercantile marine managed to slip through to the west. About 75% of the Polish airmen mobilized in Poland in Sept. 1939 found their way to France, where Edouard Daladier, the French prime minister, and General Sikorski signed a convention on Jan. 5, 1940, on the reorganization of the Polish army and air force. Two infantry divisions, a highland brigade and a motorized brigade were formed. The highland brigade commanded by Gen. Zygmunt Szysko-Bohusz

saw action in Norway, where it distinguished itself at Narvik. The 1st division under Gen. Bronislaw Duch and the 2nd division under Gen. Bronislaw Prugar-Ketling both fought on the Maginot line. Gen. Stanislaw Maczek with his motorized cavalry brigade fought at Epervan. The Polish air force shot down 69 German aircraft over France.

In June 1940 the French front collapsed and the French government moved to Bordeaux. The Polish government set up its headquarters in the neighbouring Libourne where, rejecting all suggestions of capitulation, it decided to continue the struggle by the side of the Allies. On June 18 the Polish president and government moved to England at the invitation of Winston Churchill.

In Britain the Polish army and government were reorganized for a second time after the blow sustained in the fall of France. The civil responsibilities of the government developed with their increasing responsibilities to their people in exile. Preparatory work was also done for the future peace conference, the postwar reconstruction of Poland and the ultimate resumption of its administration, and a scheme was debated for a federation of Central European states, to consist of Poland, Czechoslovakia, Greece and Yugoslavia. On Nov. 11, 1940, and on Jan. 19, 1942, a declaration and a preliminary protocol were signed by Poland and Czechoslovakia for this suggested federation.

The main effort of the Polish government-in-exile, however, was directed to the building up of a strong army. The forces evacuated from France were increased by men who escaped from Poland and by volunteers from North and South America; to these were later added the Polish troops evacuated from the soviet union and Poles who had been forcibly enlisted in the German army and captured and freed by the Allies. About 140,000 Poles were in the armed forces thus organized outside Poland. In Britain, Polish units were trained for the decisive fighting in western Europe in 1944 and 1945. The 1st armoured division, which was formed there under General Maczek fought at Falaise, Rouen, Abbeville and Saint-Omer in France; it captured Roulers and Thielt in Belgium and Terneuzen, Breda and Moerdijk in the Netherlands. On April 22, 1945, it entered Papenburg, its first town in German soil. Two weeks later it was in Wilhelmshaven. A Polish parachute brigade under Gen. Stanislaw Sosabowski took part in the action at Arnhem. The Carpathian brigade, formed before the fall of France and incorporated in Gen. Maxime Weygand's army in Syria, fought in another theatre of war. After the French capitulation it moved into British-held territory in the middle east and, led by Gen. Stanislaw Kopanski, took part in the North African campaign in 1941, distinguishing itself in the defence of Tobruk and in the fighting at Gazala and Bardia.

The troops withdrawn from the U.S.S.R. to Iran and Iraq and the Carpathian brigade were formed into the 2nd corps under the command of Gen. Wladyslaw Anders. In Feb. and March 1944 the 2nd corps was moved to Italy and incorporated in the British 8th army; it conquered the Monte Cassino height and monastery on May 18, 1944. During the pursuit of the German armies, the 2nd corps captured Ancona (July 18, 1944) and Bologna (April 21, 1945).

The Polish air force distinguished itself particularly in the battle of Britain between Aug. 8 and Oct. 31, 1940. Polish airmen in that period shot down 15% of all German aircraft brought down over Britain. Eight Polish fighter squadrons, operating from Great Britain from Aug. 1940 until May 8, 1945, shot down a total of 754 German

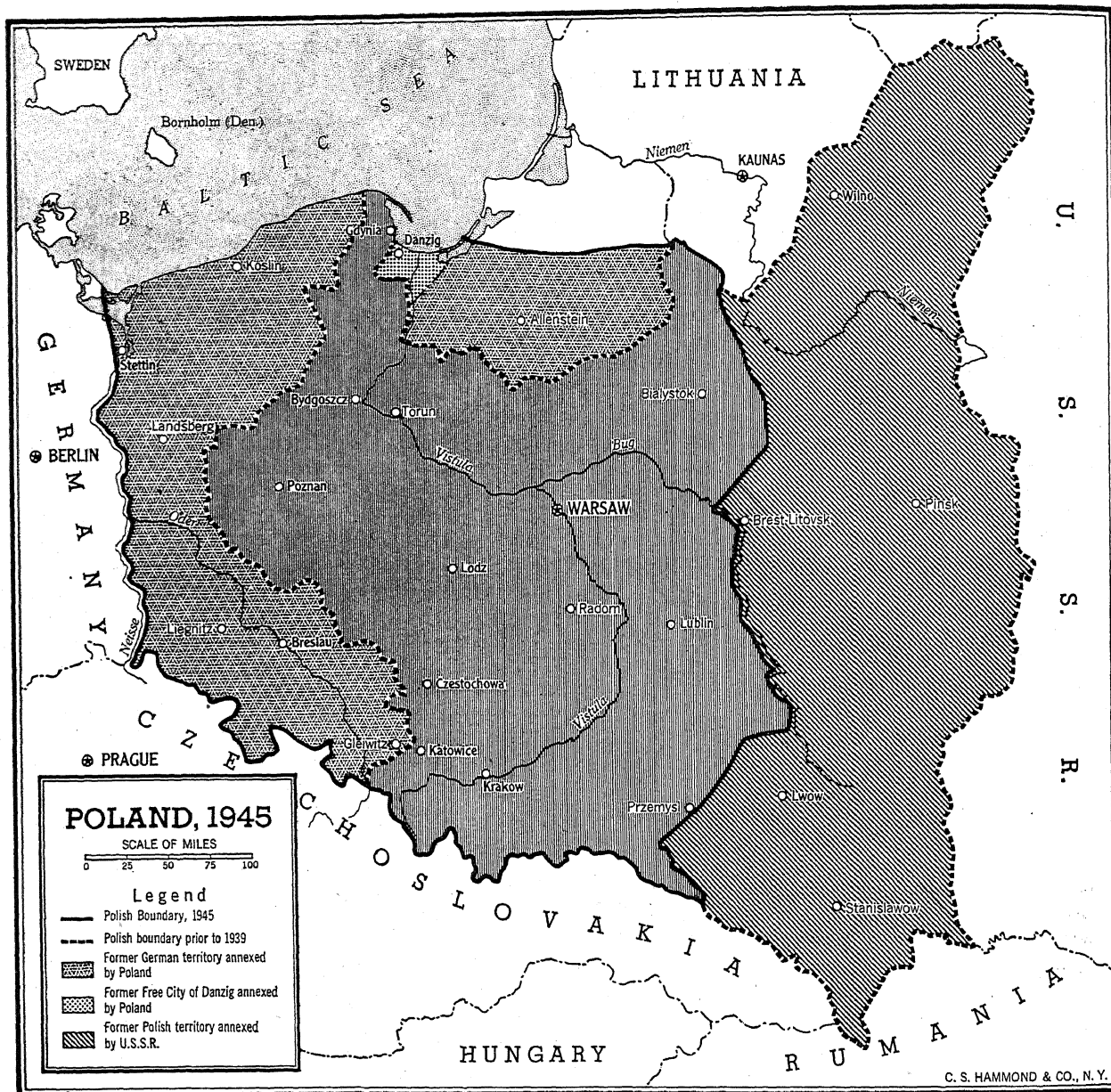
aircraft; top-scorer of the Polish fighter pilots was Maj. Stanislaw Skalski, with 19½ victories to his credit. Four bomber squadrons took part in 1,468 operations, making a total of 11,681 sorties; they dropped more than 32,082,000 lb. of bombs and mines. During this time, the Polish air force, under Air Vice-Marshal Mateusz Izycki, lost 1,968 officers, noncommissioned officers and men.

The Polish navy, under Vice-Adm. Jerzy Swirski, lost during World War II 1 cruiser, 4 destroyers, 2 submarines and 16 smaller craft with an aggregate tonnage of more than 30,000 tons. On V-E day, however, the Polish navy consisted of 1 cruiser, 6 destroyers, 2 submarines and a number of smaller craft. Among the operations in which the Polish navy took part were Narvik, Dunkirk, Tobruk, Dieppe, Normandy, Sicily, Salerno and countless patrols.

In the U.S.S.R., four infantry divisions, an armoured division and an artillery brigade were formed under soviet operational command. Polish units participated in the advance of the soviet forces in Byelorussia, the Ukraine and Poland and in the final operations against the Germans in 1945. Polish troops were responsible for the capture of Kolobrzeg (Kolberg) and Szczecin (Stettin) and entered Berlin with the soviet forces.

Poland and Russia: A New Phase.—A decisive change in the position of the Polish government took place on June 22, 1941, the day Hitler attacked the U.S.S.R. After somewhat arduous negotiations, agreement was signed in London, on July 30, by General Sikorski and Ivan Maisky, the soviet ambassador. The government of the U.S.S.R. recognized "the soviet-German treaties of 1939 as to territorial changes in Poland as having lost their validity"; diplomatic relations between the two governments were restored; the government of the U.S.S.R. expressed its consent to the formation on soviet territory of a Polish army; finally, the soviet government agreed to liberate "all Polish citizens now detained on the territory of the U.S.S.R. either as prisoners of war or on other sufficient grounds." On the day of the signature of the Polish-soviet agreement, Anthony Eden, British secretary of state for foreign affairs, handed the Polish government a note assuring them that "his majesty's government do not recognize any territorial changes which have been effected in Poland since August 1939." On Aug. 15, 1941, the Polish and soviet governments signed in Moscow a military convention providing for the formation of an autonomous Polish army, four to six divisions strong, under the command of General Anders. During the first six months, relations between the Polish and soviet governments developed satisfactorily, and on Dec. 4, 1941, General Sikorski signed with Generalissimo Stalin in Moscow a declaration stating that "in peacetime the relations between the two states will be based on the principles of good neighbourly collaboration, friendship, and the honest mutual observance of obligations agreed upon by both sides."

Soon afterward, however, serious differences and difficulties arose between Moscow and the Polish government over the nationality of the inhabitants of eastern Poland, incorporated into the U.S.S.R. after the soviet-German agreement of Sept. 28, 1939. There was also fundamental disagreement on the question of the Polish-soviet frontier. Other differences concerned the status of the Polish population in the U.S.S.R. and the organization of the Polish army there which ultimately was evacuated to the near east. This nullified one of the main clauses in the Polish-soviet agreement—that concerning joint military action. Shortly afterward Polish welfare officers who looked after



Poles in the U.S.S.R. were arrested, mainly on charges of espionage.

There was disagreement in particular over the lack of information about the fate of 10,000 Polish officers interned at Kozelsk, Starobelsk and Ostashkov. In order to counter German propaganda which charged the soviet authorities with the massacre of these officers at Katyn, the Polish government announced that it would ask the International Red Cross organization in Geneva, Switzerland, to investigate this matter. The soviet government reacted by breaking off diplomatic relations on April 25, 1943. A declaration by General Sikorski that the Polish people desired friendly relations and an alliance with the U.S.S.R. failed to change the situation, and the good offices of the Allies were in vain. Andrei Y. Vishinsky, the soviet vice-commissar for foreign affairs, declared that "the Polish government, influenced by pro-Hitler elements in its midst and outside and by the Polish press, has brought about the rupture in diplomatic relations." Meanwhile, as the soviet armies were advancing toward Poland, a union of Polish patriots was set up in Moscow in March 1943. Its organ, *Wolna Polska (Free Poland)* stressed the

need of Russian help for the Polish people and insisted that Poland must continue the struggle by the side of the Red army.

The Polish people suffered a tragic blow on July 4, 1943, when General Sikorski, who had personal charge of all military and civil affairs in Poland and abroad, was killed in an aircraft crash at Gibraltar as he was returning to England after a tour of inspection of the Polish forces in the middle east. He was succeeded by Stanislaw Mikolajczyk, the vice-premier. The controversies between the Polish government press in London and the soviet press, mainly on the frontier question, became more and more exacerbated in tone. The Polish government adhered to the frontier established by the Riga treaty, while the soviet government suggested the Curzon line, which was nearer to the Ribbentrop-Molotov line of 1939. The position of the Polish government, faced with soviet territorial demands, grew more and more tragic. It knew full well that it had to normalize its relations with the U.S.S.R., which, with its armies beating back the Germans, would exert a decisive influence on the outcome of the war and the future of Poland. Relations with the western Allies suf-

ferred because of the rupture with the U.S.S.R. Polish opinion, however, especially in exile, almost unanimously opposed the idea of territorial concessions, even if these were designed to spare the Polish nation greater sacrifices in the future. It seemed to a Polish government-in-exile that it had no mandate to accept a line that placed Wilno and Lwow outside Poland.

Poland's Fate Settled Without the Poles.—The meeting between Prime Minister Churchill, President Roosevelt and Generalissimo Stalin at Tehran in Nov. 1943 decisively shaped Poland's future. Churchill, reporting on the meeting in the house of commons on Feb. 22, 1944, recognized the legitimacy of the soviet claims to the "Curzon line" frontier. Stalin and Churchill also spoke and agreed upon the need for Poland to obtain "compensation at the expense of Germany both in the north and in the west."

The advancing soviet armies, driving the Germans before them, crossed the prewar Polish frontier on Jan. 3, 1944. Mikolajczyk, Polish prime minister, visited Washington on Jan. 5, 1944, as the guest of President Roosevelt. After the talks Mikolajczyk told a press conference that his government was willing to resume diplomatic relations with the U.S.S.R., adding that in his opinion as well as that of the United States government the question of frontiers should be settled after hostilities had ceased. On his return to London he saw Churchill and Anthony Eden, the British foreign secretary, and on July 27 went on to Moscow, accompanied by Stanislaw Grabski, president of the national council, and Tadeusz Romer, Polish foreign minister. While on the way to Moscow the party received the news that on July 22 the Union of Polish Patriots had been transformed into a committee of national liberation in Lublin as the supreme provisional authority in Poland. In fact, the delegates of this committee took part in the talks with the Polish prime minister in Moscow.

Meanwhile, one of the major tragedies in the history of the Polish nation was taking place in Poland. On Aug. 1, 1944, a rising started in Warsaw (*q.v.*), which was still in German hands. Mikolajczyk left it to Gen. Tadeusz Bor-Komorowski, commander in chief, home (underground) army in Poland, to decide when his forces were to strike. There was no response to the attempts of the Polish military leaders in Warsaw to establish contact with the soviet high command in order to agree on the timing of the rising. In these circumstances General Bor, in agreement with Jan Stanislaw Jankowski, the delegate in Warsaw of the Polish government in London, decided to give the signal. Warsaw held out for 63 days and the whole population fought with great heroism; the insurrection failed for lack of outside help. The rising cost at least 250,000 lives and the Polish capital was entirely destroyed.

The collapse of the Warsaw rising cast a shadow on the negotiations which Mikolajczyk was then conducting in Moscow. The Committee of National Liberation disapproved of the rising and blamed the Polish government for its failure. Mikolajczyk, while pleading for a free and independent Poland, was ready to make an alliance with the U.S.S.R. and receive Communists into his government and also to accept the Curzon line as a basis of negotiation, though insisting that Lwow should remain Polish. A communiqué issued at the end of the Moscow talks stated that the differences between the Polish government and the Lublin committee had been narrowed down and that talks were to be resumed. On his return to London, however, Mikolajczyk failed to find support in his cabinet on the Curzon line issue and resigned on Nov. 24, 1944. Tomasz Arciszewski, a veteran Socialist leader who arrived

in London from Warsaw in July 1944, and who did not approve of the talks with the soviet government, was then asked by President Raczkiewicz to form a new government, in which the Peasant party and Mikolajczyk declined to participate. The British government adopted a very reserved attitude to the new government. Meanwhile, the soviet army was advancing deeper into Poland. On Dec. 31, 1944, the Committee of National Liberation proclaimed itself a provisional government and was recognized as such by the soviet government.

Such was the situation when Churchill, Roosevelt and Stalin met again at Yalta in the Crimea early in 1945. The results of this conference were summed up in the official communiqué of Feb. 12 which said, in reference to Poland, that it should have a government formed on "a broader democratic basis with the inclusion of democratic leaders from Poland itself and from Poles abroad." It was to be called government of national unity. Vyacheslav Molotov (for the U.S.S.R.), W. Averell Harriman (for the U.S.) and Sir Archibald Clark Kerr (later Baron Inverchapel) (for the U.K.) were authorized to consult in Moscow with the various Polish political groups with a view to forming a Polish government which would later be recognized by the powers. The new government was pledged to hold free and unfettered elections as soon as possible. In these, all democratic and antinazi parties were entitled to participate and to nominate candidates. The leaders of the three powers declared that Poland's eastern frontier was to run along the Curzon line, with certain minor rectifications in favour of Poland, which was to receive new territories in the north and west.

Poland's future, eastern frontiers and provisional government were thus settled by the Big Three without the participation of the Poles. The method and results of this conference shocked the whole Polish nation. The vague wording of the Yalta decisions gave rise to disputes as to whether the proposed government of national unity was to be a continuation of the former Lublin government, merely broadened by the inclusion of new members, or whether it was to be a totally new government. Faced with the alternatives of leaving all power in Poland to the members of the provisional government or of himself joining that government, Mikolajczyk chose the latter course. On June 28, 1945, a provisional government of national unity was formed; it included representatives of the Polish Workers' (Communist) party, the split Socialist party, the Democratic party and the Polish Peasant party.

Between East and West.—In accordance with the Yalta declaration, the government was recognized on July 5, 1945, by Great Britain and the U.S. and then by all the governments having close relations with Poland, except the Vatican. Particularly close relations developed with the U.S.S.R., with which a number of outstanding questions were settled. As early as April 21, 1945, the provisional government concluded a 20-year treaty of friendship, mutual aid and co-operation with the U.S.S.R. The Polish-soviet frontier was fixed along the Curzon line on Aug. 16, 1945, in fulfilment of the Yalta decisions, with certain modifications in favour of Poland. Under a war reparations agreement signed on the same day, the U.S.S.R. renounced in favour of Poland its own claims to German property in territories incorporated in Poland; it also undertook to cede to Poland 15% of its indemnity from German property in soviet-occupied Germany and 15% of damages due to the U.S.S.R. from western Germany in return for supplies of Polish coal at a reduced price. A



With most of the buildings uninhabitable after the second battle of Warsaw in 1944, life in the Polish capital moved outdoors wherever possible

Polish-soviet agreement on an exchange of population was signed on July 7 and a commercial treaty on July 9, 1945.

Relations with Great Britain and the U.S. developed less favourably. The questions outstanding between Poland and Britain as a result of the joint conduct of the war remained unsolved. The greater part of the troops who had fought in the west and many civilians living in Britain did not return to Poland. No definite agreement was reached on the care of Poles in Britain, Polish war debts and the return of the gold deposited in Britain. Citing the Yalta declaration and Pres. Boleslaw Bierut's statement made in Potsdam at the end of July 1945, the British and U.S. governments insisted on the holding of free elections in Poland, reflecting the mood of the nation, a matter which aroused lively interest in the western countries. On the other hand, Polish opinion was grieved by the unreadiness of Britain and the United States to recognize the new western frontier of Poland agreed upon by the U.S.S.R. and Poland.

No progress was made in the internal political life of the country and over the consolidation of the government of national unity. Mikolajczyk's Peasant party and the remaining parties supporting the government clashed openly. On July 29, 1946, the Socialists and the Polish Workers' party decided to form an electoral bloc for the elections to be held on Jan. 19, 1947. Many members of the Peasant party were arrested or subjected to reprisals during the election campaign.

Although strained political relations with the western countries could not but react unfavourably on the eco-

nomie development of Poland, there was noticeable progress in certain fields. Five million people were settled in the newly acquired western provinces and provided with essential equipment. The reconstruction of ports, the need of which was increasingly felt, was promptly taken in hand. There was a rise in industrial production, particularly that of coal, which in 1946 reached more than 51,000,000 short tons. Internal needs were largely met out of United Nations Relief and Rehabilitation administration supplies, which in 1945 amounted to \$91,000,000 and in 1946 to \$470,000,000. A three-year economic plan to raise the general standard of living and increase the national income was put into operation.

Under the settlement, which in 1946 had yet to be confirmed by the peace treaty, the radical shift to the west of Poland's territory shook the very foundations of the Polish state. On the credit side could be counted a considerable reduction of national minorities, which had always been a source of trouble to Poland, widened access to the sea and, finally, a considerable increase in its productive capacity, both agricultural and industrial.

(H. SR.)

Poland: Statistical Data, 1938

Item	Value (000's omitted)	Amount or Number
Exchange rate		
United States		1 zloty—18.86 cents
Great Britain		24.75 zlotys—£1
Finance		
Government revenues	\$447,548 (£91,542)	
Government expenditures	\$440,381 (£90,076)	
Gold reserves	\$83,927 (£17,166)	
National debt	\$937,946 (£191,848)	
Transportation		
Railroads		12,272 mi.*
Highways		37,772 mi.*
Navigable waterways		3,813 mi.*
Airways		3,475 mi.*
Communication		
Telephones		272,000*
Telegraph lines		13,342 mi.*
Minerals		
Zinc		119,159 tons
Zinc ore (metal content)		77,161 tons
Natural gas		20,517,881,370 cu.ft.
Petroleum		558,866 tons
Crops		
Potatoes		38,093,504 tons
Rye		7,995,423 tons
Clover		3,776,259 tons
Sugar beets		3,485,914 tons
Livestock		
Cattle		10,553,654
Swine		7,525,088
Horses		3,916,173
Sheep		3,410,946
Forest products		
Total		349,616,223 cu.ft.*
Timber		190,699,758 cu.ft.*
Firewood		113,007,264 cu.ft.*
Poles, saplings, etc.		42,377,724 cu.ft.*
Sea products		
Total		15,443 tons*
Herring		8,499 tons*
Sprat		3,208 tons*
Plaice		1,235 tons*
Exports—total	\$223,437 (£45,702)	17,186,000 tons
Coal and coke	\$42,775 (£8,749)	13,168,000 tons
Timber	\$38,229 (£7,819)	1,862,000 tons
Metals and metal goods	\$24,080 (£4,925)	430,000 tons
Bacon	\$8,989 (£1,839)	24,000 tons
Imports—total	\$245,135 (£50,140)	3,650,000 tons
Machinery	\$36,364 (£7,438)	44,000 tons
Metals and metal goods	\$34,458 (£7,048)	569,000 tons
Cotton	\$22,012 (£4,502)	87,000 tons
Wool	\$18,186 (£3,720)	29,000 tons
Defense		
Standing army personnel		273,888
Reserves		1,447,000
Standing air force personnel		9,350
Military expenditures	\$145,500 (£29,761)	
Education		
Elementary schools		28,722
Students		4,851,500
Secondary schools		777
Students		221,200
*1937.		

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Polar Regions

See EXPLORATION, POLAR.

Pole Vaulting

See TRACK AND FIELD SPORTS.

Police

The years 1937-46 witnessed what were probably the greatest changes in police organization and service ever experienced in any period of comparable length. Many of these changes were the direct result of converting police mechanisms to the special problems of war-torn states, and when armed conflict diminished or ceased there was necessary reconversion to more normal operating schedules.

In that process of hurried adaptation, most police agencies underwent political, structural or administrative changes which would influence their functioning for many years to come. Particularly striking was the outright disappearance of the secret political police of defeated Germany, Italy and Japan, while even among the victors the Russian N.K.V.D. was abandoned, only to be succeeded by an apparent counterpart under a new name. While such major shifts did not necessarily represent any permanent change in policies concerning secret political police, there could be no doubt that in the vanquished countries they would be resolutely suppressed by the occupying armies, with Allied military intelligence and Allied military police temporarily succeeding the outlawed agencies.

Protective police, on the other hand, not only survived World War II but most of them were the stronger for the forcing methods under which they had been compelled to develop during national emergencies. While there were many political changes among the protective police of axis countries and a marked tendency toward decentralizing their organization and control, these were mere temporary devices by which the victors sought to prevent development of civil police into a centralized military arm during the early stages of Allied occupation.

Centralization.—Even the western powers were conscious of the influences tending toward amalgamation of police agencies. In the U.S. these pressures were exerted in 1940 and 1941 during the period of impending war. Only limited objectives were sought, chiefly in the form of closer co-ordination of some tens of thousands of independent police units. In several of the states, legislation was enacted providing for free interchange of police personnel under conditions of extreme urgency. In many others similar arrangements were made on a wholly voluntary basis without the support or compulsion of statutory law.

In all cases, however, such departures were of prime importance since they represented abandonment of the administrative self-sufficiency characteristic of the operation and development of state and local police forces in the U.S. That common action among police departments was a continuing need, even though its urgency might not be a matter of daily experience, was demonstrated in connection with the devastating flood at Louisville, Ky., in 1937. Police officers from points more than 1,000 mi. away were dispatched to the scene—a stirring evidence of police co-operation, perhaps, but also a striking example of inadequate provision for aid from points nearer to the stricken area.

In England and Wales, impending invasion brought city, borough and county constabularies more and more under national control; and while this was formally abandoned once the imminent danger point was passed, it probably exercised a considerable influence in securing enactment of the Police act in 1946 (see below).

The effect of such integrating processes would inevitably be felt in other English-speaking countries, and their operation was accordingly watched with active interest, particularly in the U.S., which continued to support the most decentralized police system in the world.

Another war-produced factor tending toward change in police patterns was the maintenance of highly specialized public safety staffs by the military governments of the conquered lands. Such staffs, whether military, civilian or both, consisted in large measure of professional police administrators who were recruited in the several antiaxis countries. Their observation of the foreign police scene and their interchange of views with colleagues from other parts of the world promised to stimulate greatly the process of re-examining the police establishments of their homelands and the abandonment of many an outworn but traditional law enforcement method.

Depletion of Police Ranks.—World War II also produced a considerable though temporary realignment of police strength. For one thing, there was a substantial reduction in the number of police, caused wholly by the departure of young patrolmen for military service, and the difficulties experienced in recruiting temporary substitutes. In U.S. cities of more than 25,000 population, the decline from 1942 to 1945 was 8.2%, while some of the state police forces showed war-caused declines of as much as 35%. In Great Britain, the numerical strength of the London metropolitan police declined by 22% in the course of the war, and the situation in other belligerent countries was similar. Most of the variations in the amount of decline stemmed from varying policies in wartime recruitment. Some U.S. forces chose to maintain the full authorized strength even though it meant the permanent acquisition of substandard personnel—those with physical defects, unsatisfactory character references, low intelligence or over-age disqualifications. Others recruited temporary police who could not meet the regular standards and hoped that such police might be separated from the rolls at war's end. A very few forces took the position that personnel standards must be maintained in recruitment, even though this involved a marked decline in numerical strength.

The war years did not require so much law enforcement as more normal times. There was less crime in nearly all categories, while fuel rationing effected a marked reduction in the volume of highway traffic and consequently in the number of traffic accidents. While such alleviations of

the police task were partly offset by new duties arising out of war's emergencies, the net effect was to make it possible to maintain civil peace and security with a smaller police establishment. Actually there was as yet no reliable formula or index of the quotas of police required in any given situation, so it remained to be seen whether war's dislocations of police routine had stimulated application of new methods in determining police manpower requirements. If anything of that sort transpired, the police developments of the decade 1937-46 would acquire added significance.

Use of part-time auxiliary police naturally flourished during the war period, and many were the police administrators who rediscovered that improved public relations arose out of the use of such devices. Accordingly, there were numerous efforts to continue the wartime police auxiliaries as a permanent reserve. Whether these would succeed was far from certain, since experience in many parts of the world seemed to indicate that householders would volunteer for police duty when their hearths were threatened but with danger removed were unwilling to sacrifice their convenience as in the days of emergency. Hence, police reserves quickly became mere paper organizations when the stimulus of dangerous days was removed and would disappear altogether if effort were made to require actual performance of auxiliary police duty. The very clear prospect was that policing urban centres would continue to be a full-time task for regularly employed police personnel.

Wartime personnel shortages in many lands tended toward diversion of women police into traffic regulation and other uniformed services, but with the return of more normal conditions their reassignment to crime prevention activities and particularly to work with women and children seemed to be well under way.

Scientific Aids.—Wartime requirements greatly stimulated the use of motor equipment and police radio, and these gains promised to be permanent. Gains were most obvious in parts of the world where motorized and radio-equipped police were least common. In the U.S., the use of two-way radio communication from and to patrol cars became almost universal. Other communications developments included the progressive installation of frequency modulation transmitters and receivers, increasing use of so-called "three-way" radio (*i.e.*, including direct radio communication between patrolling cars), extension of intra- and interstate police teletype systems in the northeastern quarter of the country, and wide extension of the interstate and international radio telegraph facilities of states farther west.

Various tentative experiments with the police use of facsimile reproductions by electronics raised the distinct possibility that with the advancement of television techniques police might come to employ its facilities in certain specialized phases of criminal investigation.

Unions and Picketing.—In the U.S., two police problems slowly emerged and by the end of the decade had reached major proportions in some jurisdictions. The long-dormant issue of police unions was again to the fore in cities large and small. In some areas, courts or city counsels ruled out union organization among police. Other communities accepted them without question, while in most places the issue was either still uncertain at the end of the decade or had not yet been sharply raised. Some communities sought to avoid the chances of a collision between the public interest and that of a police union by

inserting a "no-strike" clause in union charters; but it was still highly doubtful whether any type of collective action by police employees could be reconciled with what appeared to be the basic disciplinary requirements of a quasi-military arm. It also remained to be seen whether or not the British device of representative committees for the various police ranks would continue to be accepted as a substitute for full union recognition. Throughout the world the employment status of the policeman was being re-examined, occasionally from novel angles. Whether there could be a reconciliation of public and private interests in this highly controversial field was also problematical, but the extreme likelihood was that the issue would not everywhere be peacefully resolved. Police strikes promised to bulk larger in the law enforcement news.

Another police problem of increased proportions also reached its most acute form in the U.S. It arose both from the use of mass picketing in connection with industrial strikes and from smoldering racial antagonism among Negroes and whites. Mass picketing produced tactical problems in the use of armed force with which few police establishments were well prepared to cope, while developments in Detroit and New York arising out of the 1943 race riots presented such disquieting features and aroused such anxieties for the future peace and good order of U.S. cities as to mark the period as an important point of departure for police in both their labour and their race relations.

U.S. War Problems.—War's emergencies also set the tempo for police developments in the U.S., though not of course to the same extent as in Britain. Since the time and the setting imposed fewer extraordinary burdens upon U.S. police systems, there were fewer major changes in police patterns. Indeed, for all of the temporary shifts of emphasis induced by the war years, these systems largely returned to their prewar patterns. Changes were chiefly in the form of extensions of services already well established; radio communication, crime reporting, criminal identification, police training and laboratory facilities all extended their sway in police circles so that there was scarcely a crossroads village force in which their influence had not been felt. Even the popularly elected county sheriffs who for generations had neglected their police functions, because of the risk of political unpopularity and a lack of stimulus from the prevailing fee system, now occasionally employed uniformed patrols, patrol cars, radio and teletype communication and various other superficial marks of the modern police force. Whether the sheriff's office, having lost its law enforcement powers in the land of its origin, could reverse the course of its 300 years of decline in the U.S., remained to be seen; but if the office should be partially restored as an active influence in law enforcement, the revival would date from the ten-year period 1937-46.

War's influence upon police administration was nowhere more pronounced than in the Federal Bureau of Investigation. A mere eight years before the Japanese attack at Pearl Harbor, FBI agents possessed no authority to carry weapons or to make arrests. These defects in their status were of course quickly corrected, and the bureau proceeded to grow apace both in size and in popular esteem. In 1941 it was entrusted with supervision over espionage and sabotage cases and succeeded so well that with the outbreak of war it was able to seize virtually all spies and saboteurs planted in the U.S. by the Nazi regime. Later efforts to insinuate new teams of Nazi agents into the country were quickly foiled by the FBI. State and local police made preliminary investigations in tens of thou-

sands of war-connected cases and turned the results of their labours over to the FBI for final federal action.

Other important developments at the FBI involved initiation or extension of various central services made available to police forces in general and without charge. Most prominent in this category was the training program of the National academy, which graduated over 1,000 police officers, many of superior rank, during the ten-year period. In addition, numerous training courses were provided on a regional basis to reach the rank and file of hundreds of police forces every year.

Also significant was the growth of nationwide and uniform crime reporting, conducted by the FBI with the endorsement of the International Association of Chiefs of Police and the active participation of more than 5,000 state and local agencies. While rural areas were not yet all covered by the crime-reporting system, more than 80% of the county sheriffs were submitting returns, while 96% of all cities and towns of more than 10,000 population were included in the reporting area. In 1945 Nevada was the only state in which every urban police force (more than 2,500 population) and every county sheriff was represented in the returns of offenses known to the police.

After 22 years of growth, the national identification files totalled around 100,000,000 fingerprint cards at the end of the decade, with more than 12,000 police agencies contributing to the national system. Criminal fingerprints coming into the central files exceeded 1,000,000 annually. Single fingerprint files for the more ready identification of criminals leaving only fragmentary latent prints at the scene of a crime were maintained for more than 15,000 outstanding gangsters, extortionists, kidnappers, bank robbers and check forgers. The FBI laboratory also had shown phenomenal growth, with more than 150,000 examinations being conducted annually at the request of federal, state and local police agencies.

Training developments at state universities and state colleges, at private institutions of higher learning, at the Traffic institute operated in conjunction with Northwestern university, Evanston, Ill., and by some of the leading state and municipal police forces represented a total effort toward the improvement of the police mechanism, both in general and in detail. Federal aid for police training, under the terms of the George-Deen act passed by the U.S. congress, relieved local police authorities of some portion of the cost of training but probably did not greatly affect the total amount of training provided. Where so many hands were extended in aid of so many kinds of training facilities, the progress of the facilities was assured regardless of any financial grants that might be offered by the federal government.

International police collaboration naturally increased during World War II, and among anti-axis countries this trend was easily measured by changes in the membership distribution of the International Association of Chiefs of Police. Prior to World War II, that association was almost exclusively composed of police representatives from the U.S. and the dominion of Canada. The war years added not only many members from Latin America but also an increased representation from western Europe. It was perhaps in recognition of these significant trends that the association held its 1946 annual meeting in Mexico City.

One of the last acts in the ten-year drama that came to a close in 1946 was the conclusion of the Nuernberg trials of war criminals. Notable as having a prominent place in the current history of police was the action of the International Military tribunal in declaring certain police groups of the nazi regime—the SD or security service and



Police Commissioner Lewis J. Valentine of New York city inspecting women traffic officers graduating from the training school in Tokyo, May 1946. This class was part of the new program set in motion during Valentine's reorganization of the Japanese police system

the gestapo—to be criminal organizations, thereby rendering former members subject to summary trial and punishment. Convicted and sentenced to death was Ernst Kaltenbrunner, head of the nazi secret police under Gestapo Chief Heinrich Himmler. He died on the gallows Oct. 16, 1946. (Br. S.)

Great Britain.—Before World War II the energies of the home office and the Scottish office, the local police authorities and chief constables were largely directed to improve

ments of organization and technique with the object of ensuring that the division of the British police service into local units would not prejudice efficiency. Centralized detective schools were instituted, detective methods were overhauled, a country-wide wireless system was planned and the home office undertook the task of providing in England and Wales a network of forensic science laboratories; these measures supplemented the arrangements which had been in existence for a number of years, under which the metropolitan police maintained central criminal records and, with other large forces, helped the smaller forces in cases of serious crime.

The total establishment of the police forces in Great Britain amounted to about 70,000. The metropolitan police had an establishment of about 20,000 and the separate police force of the City of London 1,100. In England and Wales there were 60 separate county police forces with an aggregate establishment of 21,600 and 121 separate borough forces with an aggregate establishment of 21,000. In Scotland there were 31 county and 18 burgh forces, with an aggregate establishment of about 7,000. In addition, there were in 1937 about 142,000 part-time special constables, men who voluntarily undertook to give unpaid police service in an emergency. From 1937 onward the police forces were increasingly preoccupied with plans for assisting the civil population to meet dangers from the air in time of war. Establishments were increased, training was given in air-raid precautions, antigas measures and so on, and the police took a prominent part in the general development of the civil defense organization. In 1939 steps were taken to enrol the Police War reserve and the Women's Auxiliary Police corps as auxiliary forces to be called up for duty in the event of war. On the outbreak of World War II these organizations were embodied; the peak figures of full-time auxiliaries amounted to 40,000 men and 3,500 women. The number of part-time special constables rose to 181,000.

War Experience.—World War II exacted new duties from the police service. A very considerable number of police guarded vital points and buildings which might be the objects of sabotage; the work of the criminal investigation departments of the various forces was very greatly increased and special branches of the C.I.D. (Criminal Investigation Department) were established in all forces to deal with wartime security matters. The defense regulations, made under the Emergency Powers (Defense) acts, placed a number of new responsibilities on the police; they were given special powers of arrest and search and were called on to assist numerous authorities. Among the more novel powers conferred were those of liberating pigeons and controlling or slaughtering animals out of control as the result of enemy attack. They had to enforce new penal measures such as the blackout regulations, and their ordinary duties of preventing and detecting crime had to be carried on during air raids and in the blackout.

The police continued to take a prominent part in the organization and development of the air-raids-precautions organization. In the later stages of the war, they assisted the British and Allied military formations in their dealings with the civil population and shared in the planning work preparatory to the mounting of the invasion of Europe; police liaison officers were attached to the principal British and U.S. formations, and took part in planning the complicated road movements of the invasion armies to their embarkation points. In a message of June 20, 1944, from supreme headquarters, Allied expeditionary force,

Gen. Dwight D. Eisenhower expressed his deep gratitude for the great assistance which the police forces had given him, his commanders and staff in all the various stages which had led up to the Allied landings.

War experience led to a striking extension of the duties of policewomen. On the outbreak of war there were only 278 regular policewomen in Great Britain. The wartime women auxiliaries were at the outset employed mainly on ancillary duties such as clerical and telephone work, but these duties were widely extended. The concentration in Great Britain of large British and Allied military formations produced problems which called for the services of women employed on police duties proper, in numbers out of all proportion to those available in the regular service. Women were also employed as members of the Criminal Investigation department and on motor patrol work. After the end of the war, measures were taken to recruit additional regular policewomen. By July 1946 the number had increased to 645, and the marriage bar was withdrawn in England and Wales.

In order to maintain the service at an adequate strength, measures were taken by parliament first to prohibit the retirement on pension of members of the police force who had served their full time and, later, generally to prohibit resignations from the police; provision was also made for conscription into the police if this should be necessary. On the other hand, the younger men in the police were not exempted from being drafted to the fighting services, and 18,000 regular policemen went into the armed forces. Recruitment for the regular police was suspended.

Postwar Developments.—As a result of the embargo on recruitment to the regular police service during World War II, and the withdrawal as from Jan. 1, 1946, of the ban on resignations from the police, all forces fell substantially below strength. A program of recruitment over a period of about two years was undertaken. This involved the recruitment and training of about 19,600 men as against a normal peacetime intake of about 3,300 men a year. Arrangements were made, with the agreement of the local police authorities and chief officers of police, for the allocation by the home office and the Scottish home department of quarterly recruitment quotas to all police forces, and for the training of recruits to be undertaken in England and Wales by the home office and not by individual police forces. The training capacity of the local forces thus set free was used for the purpose of giving refresher courses to policemen returned from the armed forces and those whose training had suffered because of wartime pressure. Nine training schools, with a capacity of 1,800 recruits, were established by the home office for the purpose of training recruits for the county and borough forces; in view of its size separate arrangements were made for the metropolitan police. In Scotland the training of recruits and the holding of refresher courses were being carried out at three local training schools pending the provision of a central school. Technical developments in the laboratories, the C.I.D. and wireless were taken up afresh.

Certain police forces in the south of England were amalgamated under wartime powers for the purpose of facilitating military operations. It had been recognized for many years that, in modern conditions, it would be of advantage to abolish some of the smaller separate units of administration and, accordingly, provision for permanent amalgamations of forces in England and Wales was included in the Police act, 1946. This measure provided for the absorption in the county police forces of the separate forces of all noncounty boroughs, with the exception of two such boroughs (Cambridge and Peterborough) where

the population of the borough was greater than that of the remainder of the county; it also provided better machinery for the voluntary amalgamation of county forces and county borough forces in suitable cases and made provision for the compulsory amalgamation of such forces in the absence of voluntary schemes. It was made clear during the passage of the bill that these proposals did not in any way derogate from the status of the police service as a local and locally administered service and that the government had no intention whatever of creating a national or a regional police force. Provision for the voluntary or compulsory amalgamation of police forces in Scotland was made in the Police (Scotland) act, 1946. (See also CRIME; FEDERAL BUREAU OF INVESTIGATION; KIDNAPPING; SECRET SERVICE, U.S.) (C. C. C.; S. J. BAK.)

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Poliomyelitis

See INFANTILE PARALYSIS.

Polish Literature

See CENTRAL EUROPEAN AND BALKAN LITERATURE.

Political Action Committee

The C.I.O. Political Action committee was founded by action of the executive board of the Congress of Industrial Organizations on July 7, 1943, and officially endorsed at the C.I.O.'s sixth constitutional convention in Nov. 1943. It was not the C.I.O.'s first participation in politics, as many of the C.I.O. unions had engaged in various political activities in 1936 on behalf of President Roosevelt.

In a report to the 1943 convention Pres. Philip Murray of the C.I.O. set forth as the reason for the C.I.O.'s formal entrance into politics "the organization of labor's political arm. While the Committee (P.A.C.) regards preparation for the crucial national elections of 1944 as a major task, it is also looking beyond 1944 and planning for a permanent political organization of labor."

The action taken grew out of the understanding by labour officials that whatever gains labour unions won through economic action were subject to enlargement, reform, or reversal in the political field. "The elementary legislative safeguards for the protection of the health and safety of workers, such as the workmen's compensation, maximum hours for women and minors, and safety and sanitary laws were all placed on the statute books through labor activity in the political area," the report stated. The growth of organized labour during the administration of President Roosevelt, when so much labour-supported social legislation was enacted, stimulated labour's awakening to its political prowess.

Any idea that the C.I.O.'s political action work was a forerunner to a new and third political party in the U.S. was scotched by the statement that "It is definitely not the policy of the C.I.O. to organize a third party, but rather to abstain from and discourage any move in that direction."

Sidney Hillman, president of the Amalgamated Clothing Workers union, was named first chairman of P.A.C. Other

members of the committee were Van A. Bittner, vice-president of the United Steelworkers of America, vice-chairman; R. J. Thomas, then president of the United Automobile Workers, treasurer; Sherman Dalrymple, then president of the United Rubber Workers; and David J. McDonald, secretary-treasurer of the United Steelworkers. Later Emil Rieve, president of the Textile Workers union, and John Green, head of the Industrial Union of Marine and Shipbuilding Workers, were added to the committee.

Before the P.A.C. initiated its activity, it conducted a searching analysis of the vote of both political parties in presidential and off-presidential election years. Its findings indicated that candidates considered unfriendly to labour, representing, it believed, the interests of only certain sections of U.S. industry, were elected in those years when only a small percentage of the people voted. Contrary to this, when a large vote turned out, candidates considered friendly to labour and regarded by labour as working in behalf of all groups in the U.S. were elected to office. Thus, the pivot of P.A.C.'s operation was getting U.S. voters to the polls in large numbers. It was the belief of the C.I.O. that only when the maximum number of people participated in free elections would U.S. democracy remain healthy.

To carry out this aim of a large vote, P.A.C. activity centred around three major phases. One was the registration of all eligible voters. The second was the transmitting of information and voting records and statements of officials elected by the people so that a clear picture of their records could be presented to the electorate before it entered the polling booths. The third was the effort of every registered voter to utilize his franchise on election day.

Beginning in the summer of 1943, Hillman and his associates held a series of conferences with trade union leaders in various parts of the country. The purpose of these meetings was to alert the international unions of the C.I.O. and the C.I.O.'s city and state industrial union councils for the job of building political action committees. A national office was established in New York city, and 14 regional offices were set up throughout the nation. During this organizational phase, the P.A.C. was not committed to any candidate or political party.

At a conference held in Washington, D.C., in June 1944 the P.A.C.'s program, called the People's Program for 1944, was adopted. Prior to this conclave, the P.A.C. sponsored a two-day full employment conference in January which was addressed by leading labour, farm, business and governmental leaders, and focused attention on the need for maintaining full peacetime employment.

Domestically, the P.A.C. program called for enactment of the Economic Bill of Rights proclaimed by President Roosevelt in his State of the Union message in Jan. 1944. Toward this end the establishment of a national planning board composed of representatives of industry, labour and agriculture, all working in co-operation with government, was urged. The program stressed immediate adoption of legislation ensuring full employment, a comprehensive plan of public workers, a nation-wide housing program, continuation of price guarantees to farmers and encouragement of the family-owned and operated farms, full opportunity for the development of small business with strict regulation of all monopolies, a veterans' program, improvement of the social security structure through passage of a national insurance health bill, increase of educational opportunities for all, the right of labour unions to

continue their functions unhampered, a federal fair employment practices committee to end discrimination in employment and abolition of the poll tax.

The foreign policy section of the program called for strengthening and preservation of the coalition of the United Nations "based upon deepening friendship and ever closer co-operation among the governments and the peoples of the United Nations"; destruction of the basis of militarism and fascist power in Germany and Japan; elimination of international poverty, unemployment and instability through long-term credits "free from political strings"; extension of the right of asylum and guarantees of adequate protection for persecuted minorities throughout the United Nations and support for the United Nations Relief and Rehabilitation administration.

In the presidential campaign of 1944 the C.I.O. Political Action committee endorsed the candidacy of Franklin D. Roosevelt for president and Harry S. Truman for vice-president. This was the only endorsement made by the national office. It was the policy of the P.A.C. that its local affiliates make all local endorsements.

Adhering to a nonpartisan course, the P.A.C. accorded endorsement to candidates within both major political parties. To critics who pointed out that more endorsements fell to the Democrats than to the Republicans, P.A.C. reiterated its policy of selecting candidates on the basis of whether or not the candidate's record indicated understanding and support for a program of genuine social advancements.

The national office of the P.A.C. was composed of the following divisions, all designed to execute its educational program: research, public relations, press relations, women's, youth, religious, racial and foreign minorities and speakers'.

Their function was to service P.A.C. field units with materials for stimulating political activity and to serve as advisers and organizers for local action. In all, during the 1944 presidential campaign, the P.A.C. distributed more than 85,000,000 pieces of campaign literature, including posters, leaflets, pamphlets, billboards, badges, press releases, besides numerous miscellaneous items. A special radio division produced transcriptions and scripts for local use. Special tours for P.A.C. speakers were arranged, and the usual multitude of political meetings were held. Articles were especially written for the labour, Negro and foreign-language press. One union—the United Automobile workers—produced an animated cartoon on the election which was seen by more than 4,000,000 people.

These materials were merely aids for local action. It was in the communities where P.A.C. proved most effective. It established a functioning political organization through ward and precinct clubs; its volunteer workers visited homes, places of work and recreational centres. It placed advertisements in the newspapers and distributed literature on street corners. All of this was done first to arouse the public to the need for registration, and even the most partisan sources credited the P.A.C. as being one of the determining factors in the record qualification of voters. The same process was repeated during the active electioneering. On election day the entire P.A.C. machinery was devoted to getting all voters to the polls. Special car pools took those who were sick or unable to walk and both men and women minded children while housewives exercised their right to vote.

Although P.A.C. did not state that it was the deciding factor which re-elected President Roosevelt in 1944, both

its supporters and opponents agreed that it was the hub around which much of the pro-Roosevelt sentiment congregated and that it did, through its publicity and educational techniques, arouse the political consciousness of large segments of the people.

The financing of P.A.C. conformed with the federal laws which dealt with the question of funds for political candidates and the conduct of political activities. An initial contribution of \$631,214 from the national C.I.O. and its affiliated unions financed such P.A.C. educational activities as discussion of national issues and the need for registration in 1944, prior to the conventions of both major political parties. Since the law required that no union treasury could make a contribution during general election campaigns (after the political conventions), individual contributions were solicited from the members of the C.I.O. unions to carry on P.A.C.'s work in behalf of candidates.

This was an entirely voluntary procedure, as attested by the fact that while the opposition charged P.A.C. was raising a \$6,000,000 campaign fund (supposedly \$1 from each C.I.O. member), voluntary contributions in 1944 up to November totalled only \$418,100.52. Of each dollar collected, half remained in the state and community where it was collected to finance local P.A.C. work while the remainder was sent to the national P.A.C. office. This same manner of financing P.A.C. activity was carried on in 1945 and 1946. In the 1946 congressional elections campaign, the same cries of "slush fund" were raised. National P.A.C. reported that \$141,565.94 was received from individual contributions.

P.A.C.'s activities, like those of all other political groups in the U.S., were fully examined by two committees of the congress. Both the U.S. senate Privileges and Elections committee and the house Committee on Campaign Expenditures gave it a clean bill of health. The U.S. attorney general, after two extensive examinations by the Federal Bureau of Investigation, reported P.A.C.'s conduct as entirely proper and within the law.

While the P.A.C. in 1944 recognized that its primary task was the mobilization of labour's political strength, it did not isolate itself from those nonlabour elements which it considered held common views and worked for the reelection of President Roosevelt. To carry out this policy it co-operated in the formation of the National Citizens Political Action committee.

Following the 1944 election a reorganization of P.A.C., designed to strengthen it in the local communities was approved by the C.I.O. executive board. Heretofore the main emphasis had been placed on political action committees within the local unions, and while this was to continue and be developed, the state, county and city industrial union councils of C.I.O. were to be drawn more actively into P.A.C. work. These councils were composed of delegates from various C.I.O. unions and formed the focal point for such C.I.O. activity. The responsibility for establishing P.A.C.s on a state, county and city basis rested with the councils, and plans were devised to broaden C.I.O. representation. The regional system was abolished, and stress was placed on state responsibility.

From the very beginning P.A.C. was instructed to mobilize labour sentiment on political matters in the local areas. This was not confined to candidates during election periods. While legislation was being debated during the 79th session of the congress, P.A.C. was instrumental in bringing to the people facts on these issues and informing the public what it might do to present its opinions on these issues. The importance of writing letters and telegrams to congressmen and senators, of sending delegations

from unions to Washington personally to visit and discuss these bills with the elected representatives of the people was continually stressed. The same process was repeated for state and community legislation.

Many of the measures of the 1944 program were again called for in the 1946 program. Of special concern to P.A.C. was the continuing rise in the cost of living, and it urged passage of price control legislation. It pledged itself to fight through political action those forces in both parties which were opposed to a program of genuine social advancement not only for labour alone but for all the people.

In the field of foreign affairs the 1946 program again renewed C.I.O.'s belief in the United Nations and scored attempts to split unity among the U.S., Great Britain and the soviet union.

While aiming at a large vote turnout in general elections, P.A.C. continually emphasized the importance of primary elections. In many localities, before a candidate received P.A.C. support both in the primary and general election, he was invited to attend a meeting of the committee where he could state his views on certain public issues. Sometimes a written questionnaire for the same purpose was distributed. Such replies were often printed in labour newspapers so that the union members could see for themselves what candidates believed.

The committee suffered a severe loss in Sidney Hillman's death on July 10, 1946. No new chairman was named. Instead a P.A.C. board was created consisting of David J. McDonald, Julius Emspak, William Pollock and George Addes, secretary-treasurers of the United Steelworkers, United Electrical Workers, Textile Workers and United Automobile Workers unions, respectively, and Jack Kroll of the Amalgamated Clothing Workers union. Kroll was named director. The Political Action committee was enlarged to contain all of the vice-presidents of the C.I.O.

During 1945 and through the 1946 congressional campaign, P.A.C.'s educational campaign continued, but the results of the 1946 campaign indicated that P.A.C. did not fare too well. Many of the candidates it supported lost. There was no halt in its activities, however. The eighth constitutional convention of the C.I.O. in Nov., 1946, gave it its full blessing and called upon it to work in conjunction with its progressive allies. The national headquarters were moved from New York to Washington, D.C. and a five-point program was announced, based on mobilizing support against antilabour legislation in the congress and state legislatures, presentation to the public of all the C.I.O.'s constructive proposals, the building of more active ward and precinct organizations and participation in local municipal elections in 1947.

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Political Parties

See COMMUNISM; CONSERVATIVE PARTY, GREAT BRITAIN; DEMOCRATIC PARTY; ELECTIONS; FASCISM; LABOUR PARTY, GREAT BRITAIN; LIBERAL PARTY; REPUBLICAN PARTY; SOCIALISM.

Polo

Polo passed through three distinct periods during the decade 1937-46. In the first period, it was a flourishing

and growing sport in the United States, with more players and member clubs than ever before and about to take its place as a major sport on the U.S. scene. It was played throughout most of the world, with probably a more diverse following than any other sport—in such scattered places as Argentina, Austria, Australia, Brazil, Canada, China, Cuba, Great Britain, France, Germany, Hawaii, India, Eire, Italy, Mexico and the Philippine Islands. Even the U.S.S.R. was experimenting with the game as a possible training sport for cavalry officers. During these years, teams from Great Britain and Argentina visited the United States, and international polo was conducted at what is generally known as the American centre of the game, the Meadow Brook club on Long Island.

The second period opened with the entry of the United States into World War II at the end of 1941. National championships were called off and the game became absolutely dormant as most of the players went off to war and most of those remaining behind could not spare the time or effort to keep the sport alive. Some of the best players were killed in action, including the greatest player ever developed in the United States, Thomas Hitchcock, Jr. Others who never returned included G. M. Carnochan, Charles M. Armstrong, Jr., Col. D. T. Crow, W. S. Farish, Jr., George H. Mead, Jr., John Milburn and Charles S. von Stade. With the game at a virtual standstill for four years, critics predicted that it would never come back.

However, when the war finally ended, the United States Polo association, governing body of the game, was among the first of the sporting bodies to announce that its sport would be resumed and that all efforts would be exerted to put polo back on the sports map. The recovery, or third period, was rapid. Tournament polo was played on the Pacific coast during the early months of 1946, and indoor polo championships attracted large crowds to the Squadron A Armory in New York city at the same time. With the advent of spring in 1946, polo started again at clubs along the Atlantic coast and throughout the middle west. A Mexican team was invited to Meadow Brook for an international series in the fall of that year, and a picked U.S.

Mid-field action during the national open polo semi-finals between Texas and the Pelicans of Westbury, N.Y., at Westbury, in Sept. 1941. The Pelicans won by a score of 9-7



four defeated them in two straight games.

Polo, from its high of ten years before, through its standstill stage during the war, had started on the road back. The Polo association realized that there were difficult years ahead; some of the main problems were the high cost of the sport; the U.S. army's almost complete mechanization, which took away a large group of army players and government financial support; the lack of ponies and the lack of manpower to take care of playing fields and equipment.

WINNERS OF UNITED STATES POLO ASSOCIATION CHAMPIONSHIPS

National Open

- 1937 Old Westbury (M. G. Phipps, Cecil Smith, S. B. Iglehart, C. V. Whitney) 11; Greentree 6.
 1938 Old Westbury (M. G. Phipps, Cecil Smith, S. B. Iglehart, C. V. Whitney) 16; Greentree 7.
 1939 Bostwick Field (G. H. Bostwick, R. L. Gerry, Jr., E. T. Gerry, E. H. Tyrrell-Martin) 8; Greentree 7.
 1940 Aknusti (G. S. Smith, R. L. Gerry, Jr., E. T. Gerry, A. L. Corey, Jr.) 5; Great Neck 4.
 1941 Gulf Stream (J. H. A. Phipps, M. G. Phipps, C. S. von Stade, A. L. Corey, Jr.) 10; Aknusti, 6.
 1942-45 Inclusive—Not Played.
 1946 Mexico (Gabriel Gracida, Guillermo Gracida, Alejindro Gracida, Jose Gracida) 11; Los Amigos, 9.

Junior

- 1937 Santa Barbara (Harry East, Alex J. Bullock, E. H. Tyrrell-Martin, Charles H. Jackson, Jr.) 12; Narragansett 7.
 1938 Bostwick Field (E. H. Gerry, G. H. Bostwick, R. L. Gerry, Jr., C. S. von Stade) 8; Aknusti 5.

Twenty Goal (formerly Junior)

- 1939 League of Nations (J. K. Secor, Robert Skene, G. A. Oliver, Jr., Robert Loewenstein) 15; Hurricanes 9.
 1940 Great Neck (G. H. Dempsey, J. P. Grace, Jr., S. B. Iglehart, E. N. Carpenter) 12; Bostwick Field 7.
 1941 Bostwick Field (Sidney Culver, G. H. Bostwick, C. S. von Stade, A. L. Corey, Jr.) 9; Hurricanes 4.
 1942-46 Inclusive—Not Played.

Inter-Circuit

- 1937 Houston Huisache (R. D. Farish, S. P. Farish, William Dritt, Lt. A. H. Wilson, Jr. Sub: Vernon Cook) 10; Field Artillery School 5.
 1938 Field Artillery School (Capt. A. E. Solem, Capt. J. A. Smith, Jr., Lt. D. W. Sudduth, Lt. E. A. Walker) 9; Austin 8.
 1939 Houston Huisache (R. D. Farish, William Dritt, Harry Evinger, W. S. Farish, Jr.) 14; Oak Brook 4.
 1940 Blue Hill Farm (Walter Hayden, Peter Hayden, Hervey Swann, J. M. Romfh) 11; 7-11 Ranch 8.
 1941 Houston Huisache (R. D. Farish, William Dritt, R. S. Nichoalds, R. Humberson) 15; Ivory Rangers 7.
 1942-46 Inclusive—Not Played.

Twelve Goal

- 1937 Santa Barbara (Oliver Wallop, Hale Marsh, Ray Bell, Charles H. Jackson, Jr.) 7; Houston Huisache 6.
 1938 Not completed.
 1939 Pegasus (Del Carroll, C. C. Combs, Jr., C. R. Harrison, Hugo Anson) 12; Houston Huisache 8.
 1940 Gates Mills (J. Knutsen, Alfred House, Courtney Burton, John Hammond) 6; 7-11 Ranch 5.
 1941 Oak Brook (H. O. Owen, Jr., Paul Butler, Dan Peacock, Charles Aaberg) 7; Houston Huisache 6.
 1942-1946 Inclusive—Not Played.

WINNERS OF THE MONTY WATERBURY MEMORIAL CUP

- 1937 Old Westbury (M. G. Phipps, Cecil Smith, S. B. Iglehart, C. V. Whitney) 11; Greentree 10.
 1938 Aknusti (E. T. Gerry, R. L. Gerry, Jr., Capt. C. T. I. Roark, R. R. Guest) 11; Old Westbury 8.
 1939 Greentree (J. P. Grace, Jr., Robert Skene, Thomas Hitchcock, Jr., J. H. Whitney) 10; Texas 8.
 1940 Great Neck (G. H. Mead, Jr., J. P. Grace, Jr., S. B. Iglehart, R. E. Strawbridge, Jr.) 12; Aknusti 5.

- 1941 Gulf Stream (J. H. A. Phipps, M. G. Phipps, C. S. von Stade, A. L. Corey, Jr.) 8; Aknusti 7.
 1942-45 Inclusive—Not Played.
 1946 Miraflores (T. Zavaleta, F. Vogelius, E. Brown, O. Tri-cerri) 12; California 10.

INTERNATIONAL POLO

- 1939 Won by UNITED STATES (11-7, 9-4) at Meadow Brook. UNITED STATES: No. 1, Michael G. Phipps; No. 2, Thomas Hitchcock, Jr., No. 3, Stewart B. Iglehart; Back, Winston F. C. Guest. GREAT BRITAIN: No. 1, Robert Skene; No. 2, Aidan Roark; No. 3, Gerald Balding; Back, Eric H. Tyrrell-Martin.
 1942-46 Inclusive—Not Played.

Mexico vs. United States—1946

- 1946 Won by UNITED STATES (10-4; 11-4) No. 1, Michael G. Phipps; No. 2, Cecil Smith; No. 3, S. B. Iglehart; Back, Peter Perkins. MEXICO: No. 1, Gabriel Gracida; No. 2, Guillermo Gracida; No. 3, Alejindro Gracida; Back, Jose Gracida.

(R. F. K.)

Polymerization

See CHEMISTRY.

Poorten, Hein ter

Poorten (1887—), Netherlands army officer, was educated at the Breda Royal Military academy, and was commissioned a 2nd lieutenant in 1908. One of the first Netherlands officers to obtain a pilot's licence, he won an international prize for a flight in a balloon. He was made chief of staff of the Netherlands Indies army in 1937, and commander in chief of the N.E.I. army and head of the war department in Oct. 1941. After Japanese invasion forces landed on the island of Borneo in late Dec. 1941, Gen. ter Poorten called upon the Allies for more bombers, fighting planes and anti-aircraft to stem Japanese thrusts in Sarawak and Dutch Borneo. On March 2, 1942, he was given command of Allied armies in Java, but eight days later, the Japanese conquered Java and Poorten was captured and taken into custody by the Japanese.

Popham, Sir Robert Brooke-

See BROOKE-POPHAM, SIR ROBERT.

Popular Music

See MUSIC.

Populations of the Countries of the World

See AREAS AND POPULATIONS.

Pork

See MEAT.

Portal of Hungerford, 1st Viscount

Viscount Portal (Charles Frederick Algernon Portal) (1893—), royal air force officer, was born at Hungerford, Berkshire, England. He was educated at Eton and Christ college, Oxford. During World War I, he served with the British forces overseas, joining the royal air force in 1918. He was commander of British forces in Aden (1934-35), instructor at the Imperial Defense college (1936-37), director of organization at the air ministry (1937-38) and air member for personnel on the air council (1939-40). In March 1940 he was appointed commander-in-chief of the R.A.F. bombing command. In this capacity, he directed the R.A.F. attacks on nazi channel bases in France, Belgium and the Netherlands. Although he had only 190 bombers for the purpose, he succeeded in smashing German invasion barges moored at the channel

ports, thus forestalling a possible invasion of Britain. In Oct. 1940, he was made chief of the air staff and was promoted to marshal of the air force, Jan. 1, 1944. Lord Portal, who was created baron in 1945, retired as chief of the air staff on Jan. 1, 1946. On the latter date he was awarded the order of merit and was created Viscount Portal of Hungerford.

Porter, Paul Aldermandt

Porter (1904–), U.S. government official, was born Oct. 6, 1904, in Joplin, Mo. He was graduated from the University of Kentucky law school. In 1935, Secretary of Agriculture Wallace made him an executive assistant to the head of the Agricultural Adjustment administration. Two years later (1937), he left the AAA to become Washington counsel for the Columbia Broadcasting system, holding this post until 1942, when he was appointed deputy administrator in charge of rent control in the Office of Price administration. He resigned in June 1943 and the following month joined the War Food administration as associate administrator. Porter was public relations director for the Democratic national committee in 1944, and on Dec. 21, 1944, Roosevelt appointed him to the chairmanship of the Federal Communications commission.

On Feb. 14, 1946, Pres. Truman shifted Chester Bowles to head the re-established Office of Economic Stabilization and named Porter as Bowles's successor as director of OPA. Porter pledged himself to hold down prices until the "tide of inflation passed." He barred increases in price ceilings and appealed for support of the stabilization program. He resigned Nov. 29, 1946, after the OPA had been shorn of most of its powers.

Porto Rico

See PUERTO RICO.

Portugal

A republic in southwestern Europe, Portugal forms part of the Iberian peninsula and is bounded on the N. and E. by Spain and on the S. and W. by the Atlantic ocean. Area (including Azores and Madeira), 35,413 sq.mi. Pop. (census Dec. 1, 1940), 7,722,152; (official est. June 30, 1945), 8,132,942. Chief towns (census 1940): Lisbon (cap. 709,179), Oporto (262,309), Coimbra (35,437), Setúbal (37,071). Language: Portuguese; religion: predominantly Roman Catholic. President throughout the decade 1937–46 was General Antonio Oscar de Fragoso Carmona, provisional Nov. 29, 1926; elected March 25, 1928; re-elected Feb. 17, 1935, and Feb. 8, 1942. Prime minister: Dr. Antonio de Oliveira Salazar (named July 5, 1932).

The Strict Economy.—Despite the difficulties which beset the ten years from 1937 to 1946, and notwithstanding the almost complete stoppage of international trade and the greatly increased military expenditure arising from the world conflict, the task entered upon in 1926 was continued. The tradition of strictness in the country's finances was maintained through balanced budgets, the increase in the gold reserves of the Central bank and the creation of new taxes, particularly the war profits tax and the revised supertax. Development work continued both at home and in the colonies. Irrigation and hydraulic works in general, both agricultural and urban, underwent considerable expansion, the control of several rivers having been improved and the value of a number of important regions enhanced. The utilization of hydroelectric power constituted one of the foremost questions of the decade and was receiving the closest attention of the government, which was endeavouring to intensify the



Jewish refugees stranded in Lisbon in 1940. Thousands of émigrés driven from nazi countries crowded the Portuguese capital in that year, hoping to leave Europe with the aid of the Joint Distribution committee, a U.S. relief agency

work already begun on a large scale.

The mercantile marine was in full process of overhaul in spite of the arduous efforts required of it during the war: in addition to the new ships building abroad—the majority of them in Great Britain—a considerable number of smaller vessels were being built in Portugal. Aerial communications expanded greatly both in the mother country and in the colonies. This expansion was specially noteworthy in Angola and Mozambique, and lines were equipped with many new aircraft. Aerodromes were built in the Azores, Cape Verde, Portuguese Guinea, Angola and Mozambique. Lisbon, centre of international communications, was provided with a first-class airport at Sácarvem.

Improvements continued in the housing of public services of fundamental importance, such as education, telecommunications and transport. The reform of secondary education was published on Oct. 10, 1946, and those of university and technical educations were in the course of preparation.

The industrial problem was approached by the government with a view to improving output in the existing industries by the replacement of their equipment and to stimulating the growth of new industries of importance to the national economy. The fishing industry was greatly developed and also its sister industry, fish canning. The intensive reafforestation of the country was continued.

In the social field many collective contracts were signed fixing minimum salaries and holidays with pay. The housing of the population underwent noteworthy development, particularly as regards the building of dwellings for the poorer classes. There was a widening of the basis of assistance to workers in sickness and old age. New

holiday schemes were launched for the children of the poorer classes, and aid was given to private charitable institutions as well as to workers' syndicates providing cheap meals to wage earners or the destitute.

The civil procedure and penal codes were reformed. The penal system, both repressive and preventive, was improved. New prisons were built and several existing ones modernized. The armed forces were equipped with modern material and trained and prepared for the eventuality of war.

In the field of irrigation and water supply, the Corporative chamber in 1938 approved a \$44,800,000 irrigation scheme. By 1945, an area of 27,000 ac. had been improved and plans had been passed covering a further 142,000 ac. By 1942, a sum of 100,000,000 escudos had been spent on the regulation of rivers and canals. Since 1942 294 important works for the improvement of water supplies had been completed and 159 put in hand; the additional cost was 35,000,000 escudos.

In the execution of a vast plan for increasing the water supply to Lisbon and its suburbs a total of 139,000,000 escudos had been spent by 1942.

On Oct. 29, 1945, there were signed at Lisbon and Oporto respectively the articles constituting two companies: the Hidro-Elétrica do Zêzere and the Hidro-Elétrica do Cávado. In each one-third of the capital was held by the state. These two hydroelectric projects were expected to exercise a profound influence on the country's economy.

Approval was given on Aug. 10, 1945, to an extensive project for the expansion of the merchant navy and the replacement of old tonnage by new. It provided for the construction of 96 ships of c. 586,000 tons to be built up to 1950.

Following the reform of the post and telegraph services, it became possible in 1935 to launch a development scheme which in 1946 was still being carried out.

By 1946 nearly 3,000 dwellings for the poorest classes had been built in Lisbon and 1,376 in Oporto, and 5,000 more were to be built throughout the country in pursuance of a decree published in April 1945. Their cost was to be defrayed partly by the state and partly by the municipalities and charitable institutions. Lisbon municipality were levelling a site within the area under their control, on which were to be built dwellings capable of housing 50,000 middle-class people at low rentals. The municipality of Setúbal had under construction 220 houses for poor people, and a similar scheme was completed in Nov. 1945 at Faro, in the south.

Under a plan published in 1940, which took into account the probable increase in population during the subsequent ten years, 7,180 new school buildings comprising 12,500 class-rooms were under construction in 1946.

The year 1940 saw the creation by the state of the under-secretariat for social assistance. This department exercised superintendence over the civil hospitals, the *Misericórdias* (charitable institutions), the dispensaries, the homes and asylums, as also over the direction general of health and the direction general for public assistance. In 1944 the government published a law laying down the bases for the social assistance services, and another in 1945 creating the social aid fund.

The autonomous road board, which had been created in 1927 and re-organized in 1933, when it was provided with a ten years' fund of 1,000,000,000 escudos, had by 1942 built 1,739 mi. of new roads and repaired 5,673 mi. and

built 135 bridges and repaired 102. On July 13, 1946, a further extraordinary grant was made to the board. As the result of the improvements thus promoted, the number of motorcars on the roads had been trebled in the 15 years ending in 1946. There were then 47,469 motorcars; at the end of 1942 there were 800 motor coach services, covering 7,083 mi. of roads and carrying 22,000,000 passengers annually.

From 1934 to 1938, 45,872,852 escudos were spent on the reafforestation of mountainsides and dunes. In 1939 began the reafforestation of the region north of the Tagus at a cost to the state of 1,085,912,000 escudos.

Steps were also being taken to replenish the rivers with fish. During the 6 years to 1942, 1,172,500 specimens were supplied by the hatcheries.

The national broadcasting service was reorganized in 1940. It was equipped with two 50 kw. transmitters—one medium wave transmitting to the continent, and the other short wave transmitting to the colonies and overseas.

Foreign Policy.—In the field of international affairs, the policy of Portugal during the decade must be viewed against the background of the situation created by World War II. On defining its attitude at the outset of hostilities, Portugal conditioned its political position to the duties of the Anglo-Portuguese alliance. This sense of the importance of undertakings arising from a centuries-old alliance was one of the main considerations in the formulation of the policy followed by the Portuguese government during the war. It was in pursuance of that policy that, in Oct. 1943, Portugal, in compliance with a request put forward by Great Britain, authorized the establishment of British air and naval bases on the island of Terceira (Azores).

Similar facilities were granted to the United States of America on the island of Santa Maria.

In the far east, the occupation by the Japanese of the Portuguese colony of Timor was a blow which deeply wounded the Portuguese nation.

Macao, the ancient Portuguese colony facing Hong Kong, succeeded, not without heavy sacrifice, in avoiding the horrors of occupation. The colony became a refuge for many thousands of Europeans and Asiatics fleeing from the Japanese forces.

This sanctuary, however, was no more than the counterpart of the aid and succour given in continental Portugal to refugees from the war in Europe. In 1940 alone, the year of the German offensive in the west, Portugal gave shelter to almost 40,000 foreign nationals, many of whom were Jews.

Throughout the war Lisbon was the centre of aerial communications for the Atlantic, the base for many activities of the International Red Cross and the port from which sailed numerous ships carrying supplies to prisoners of war, and also the place chosen for the meeting of the control committee of the League of Nations.

In 1940 Portugal completed the 8th century of its existence as a nation and the third since the restoration of its independence. The centenary celebrations, which included the great "Exhibition of the Portuguese World," were attended by special envoys from almost all countries. (D. P.)

Salazar's Dictatorship.—The *Estado Novo* constitution, promulgated by decree on March 19, 1933, provided for an authoritarian political regime on a corporative basis. Formed in 1931, the national union was the sole political organization entitled to present a list of candidates in the four elections for the national assembly (1934, 1938, 1942 and 1945). In Oct. 1945, following Anglo-U.S. advice,

Portugal: Statistical Data

Item	1938		1941		1945	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
United States		1 Escudo = 4.42 cents		1 Escudo = 4 cents		1 Escudo = 4.05 cents
Great Britain		110 Escudos = £1		100 Escudos = £1		100 Escudos = £1
Finance						
Government revenues	\$113,412 (£23,197)				\$115,221* (£28,555)	
Government expenditures	\$102,664 (£20,999)				\$115,180* (£28,545)	
Gold reserves	\$40,681 (£8,321)				...	
National debt	\$318,373 (£65,120)				\$244,937* (£60,703)	
Transportation						
Railroads		2,224 mi.				
Highways		13,837 "				
Navigable waterways (rivers)		496 "				
Communication						
Telephones		70,772		82,598		
Telegraph lines		4,713 mi.		1,293 mi.		
Radio sets		81,171		113,730		
Minerals						
Tungsten		6,194,926 lb.		11,713,040 lb.		
Pyrite ore		615,444 tons		...		
Copper		5,384 "		298 tons		
Barite		52,910 lb.		85,979 lb.		
Crops						
Potatoes		653,333 tons		689,027 tons		139,312 tons†
Wheat		474,099 "		494,734 "		405,750 " †
Corn		326,501 "		426,330 "		443,172 " †
Rye		113,427 "		97,889 "		103,184 " †
Livestock						
Poultry				6,739,673 ‡		6,161,065 ‡
Sheep				3,948,320 ‡		3,889,875 ‡
Swine				1,252,975 ‡		1,176,888 ‡
Goats				1,243,980 ‡		1,196,232 ‡
Forest products						
Cork		199,524 tons				107,756 tons*
Resins		32,475 "				46,022 " *
Turpentine		8,859 "				11,684 " *
Pitwood		281,497 "				...
Sea products						
Sardines (exports only)		43,303 tons§		84,712 tons		146,521 tons||
Cod		11,545 " §		23,025 "		25,397 " ||
Exports—total	\$50,432 (£10,315)	...	\$118,965 (£29,505)	...	\$131,118 (£32,535)	742,000 tons
Wines	\$10,321 (£2,111)	...	\$7,743 (£1,920)	15,868,000 gal.	\$13,410 (£3,328)	14,903,000 gal.
Cork (unmanufactured)	\$7,751 (£1,585)	...	\$19,431 (£4,819)	...	\$10,457 (£2,595)	135,000 tons
Sardines	\$7,384 (£1,510)	...	\$18,482 (£4,584)	55,000 tons	\$20,231 (£5,020)	42,000 "
Olive oil	\$3,247 (£664)	...	\$907 (£225)	...	\$323 (£80)	895 "
Imports—total	\$101,830 (£20,828)	...	\$98,787 (£24,501)	...	\$164,267 (£40,761)	1,927,000 tons
Coal and coke	\$7,710 (£1,577)	...	\$10,103 (£2,506)	...	\$12,308 (£3,054)	546,000 "
Cotton (raw)	\$6,168 (£1,262)	...	\$6,902 (£1,712)	...	\$10,706 (£2,657)	26,000 "
Wheat	\$5,030 (£1,029)	...	\$4,311 (£1,069)	...	\$20,913 (£5,189)	283,000 "
Cod (dried)	\$4,663 (£954)	...	\$3,244 (£805)	...	\$3,329 (£826)	10,000 "
Defense						
Standing army personnel		54,814		30,000 ‡		
Reserves		460,000		126,000 ‡		
Standing navy personnel		6,269		...		
Standing air force personnel		986		868 ‡		
Reserves . . . . .		...		50 ‡		
Military expenditures	\$30,000 (£6,136)	...	...	...
Education						
Elementary schools		7,962 ‡				7,714 ||
Students		462,854 ‡				542,925 ||
Secondary schools		42 ‡				42 ||
Students		18,242 ‡				15,846 ||
Universities		3 ‡				3 ||
Students		5,182 ‡				9,927 ||

*1942. †1944. ‡1940. §1937. ||1943. ¶1939.

Salazar announced that "free elections" would be held on Nov. 18; he granted his people certain freedom of the press, of speech and of assembly. *Republica*, a daily newspaper with a total circulation of 15,000, accepted in good faith the government's change of heart and ran a series of editorials critical of the regime; within a few days its circulation in Lisbon alone rose to 100,000. The opposition was allowed to participate in the election under certain conditions: (1) a candidate had to declare his acceptance of the corporate state; (2) no one who had spent some

years outside Portugal could run for office. The opposition parties—Republican, Socialist and Communist—formed the M.U.D. (*Movimento de Unidã Democratica*) which asked that the voting be postponed for six months, and backed up their demand with mass meetings and demonstrations. The government refused any delay, and reintroduced the preventive censorship of the press; whereupon the M.U.D. issued a call for a boycott of the election. On polling day no more than 25% of the electorate voted. (See also PORTUGUESE COLONIAL EMPIRE.)

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Portuguese Colonial Empire

The total area of the Portuguese colonial empire in 1946 was approximately 803,850 sq.mi.; total population (1940 census) 10,862,000 excluding metropolitan Portugal, the Azores and Madeira. Certain essential facts and figures relating to the colonial possessions of Portugal are given in Tables I and II.

Toward Reform.—In 1937 the Portuguese colonial empire was just emerging from the depression caused by the world economic crisis, although in the southern African colonies this revival was gravely hindered by a plague of locusts.

The difficulties arising from the slump and from other evils of longer standing compelled far-reaching financial reforms. Steps were taken to intensify the development of the various territories and the progress of colonization, to foster the well-being of the natives and to tighten the moral bonds between all parts of the Portuguese nation.

The first imperial economic conference met in 1937, attended by delegations from all the colonies for the purpose of discussing the problem, common to all, of their relations among themselves and with the mother country.

In 1938 a start was made with the economic organization of the main empire production (cotton, cereals, coffee) through the creation of boards with headquarters in Lisbon, on which were represented the producers and traders working in collaboration with experts and government officials. In that same year, General A. O. de Fragosa Carmona, president of the republic, accompanied by the minister for the colonies, Dr. Francisco Machado, paid an official visit to the colonies of São Tomé and of Angola, having inaugurated in the latter colony a great trade exhibition.

A five-year development fund had been created for Mozambique in Feb. 1937; in Aug. 1938, coinciding with the visit of the president, a similar fund was set up for Angola, to be spent by 1945. In 1939 the president visited the colonies of Cape Verde and Mozambique. During his tour he was the guest of the Union of South Africa, being the first foreign head of state to pay an official visit to that country.

War Problems.—World War II brought many troubles to the Portuguese colonies, with the loss of markets and their trade hindered by the shortage of shipping and by the introduction of the navicert system. Every effort was made, however, to increase production in order to supply Portugal with the goods it was unable to obtain from other sources, and also in order to help friendly nations. Imports of capital goods, motor cars and other goods became very scarce and costly.

The value of the colonial products exported, however, did not rise in proportion owing to the policy of price stabilization laid down by the government.

Portuguese Timor was occupied first by the Australians and Dutch, and later by Japanese forces (1942) who remained until 1945.

Although protesting energetically against Japanese acts of violence, Portugal had no other course but to remain neutral, as Japanese forces had also surrounded the Portuguese possession of Macao, in China, a small peninsula 5 sq.mi. in area, with the town of that name where a great number of British, American and Chinese nationals had found refuge, swelling the number of inhabitants to about 400,000 (thus making the density of population the highest in the world).

Clearly hostilities in Timor would have resulted in the loss of Macao with the perpetration by the Japanese of acts of violence against the population, and the Portuguese government, in agreement with the United Nations, found itself constrained to await the clarification of the military situation in south China or at least in the Pacific before taking part in the military operations for the liberation of its territories.

As a result of the difficulties created by World War II, the need arose for closer contact between the government in Lisbon and the colonies. Thus, in 1941 the then minister for the colonies, Dr. Machado, visited Cape Verde and Portuguese Guinea. In 1942 on the occasion of the termination of the Mozambique company's concession (granted in 1891 for the administration of the territories of Manica and Sofala, with the port of Beira, terminus of the Beira

Table I.—Portuguese Colonial Empire

Country and area (in sq.mi.)	Population Census 1940	Capital, Status, Governor
AFRICA		
Angola (Portuguese West Africa) 481,351	3,740,000	Luanda, colony, governor general: Cmdr. Vasco Lopes Alves
Cape Verde Is. 1,557	181,000	Praia, colony, governor: Cmdr. João de Figueiredo.
Mozambique (Portuguese East Africa) 297,654	5,086,000	Lourenço-Marques, colony, governor general: Gen. João Tristão de Bettencourt.
Portuguese Guinea 13,944	351,000	Bolama, colony, governor: Cmdr. Manuel Maria Sarmiento Rodrigues
São Tomé and Príncipe Is. 372	60,000	São Tomé, colony, governor: Capt. Carlos de Sousa Gorgulho
ASIA		
Portuguese India 1,537	624,000	Nova Gôa, colony, governor general: Col. José Ricardo Pereira Cabral.
Macao 5	340,000	Macao, colony, governor: Cmdr. Gabriel Maurício Teixeira
Timor 7,330	(est. 1938) 480,000	Dilly, colony, governor: Capt. Manuel de Abreu Ferreira de Carvalho

and the trans-Zambezi railways), he again visited Angola and Mozambique.

Important contingents of troops were sent at that time to garrison the Cape Verde Islands, Angola, Mozambique and Portuguese India.

By agreement with the United Nations, an expeditionary force was concentrated at Lourenço Marques for the purpose of taking part in the operations for liberating and occupying Timor. In view of the imminent Portuguese intervention in the Pacific war, the new minister for the colonies, Dr. Marcelo Caetano, visited Angola and Mozambique from June to Nov. 1945, and at the time of the Japanese collapse was in Lourenço Marques, where he was present at the departure of the troops for Timor.

Immediately on receiving notice of the surrender from the Japanese command, the governor of Timor (who had been kept a prisoner) enlisted the services of the Portuguese nationals left on the island—all of whom were as ill and weak as he—to restore the colony's administrative machinery.

In a few days the Portuguese administration was restored, without a shot having been fired, thanks to the

loyalty and devotion of the natives.

When the troops arrived, together with a mission of government officials, they found the island pacified and the Japanese on their way to detention camps in Australia.

During Caetano's stay in Lourenço Marques, the colony received the visit of Field Marshal Jan Christiaan Smuts (July 1945).

Shortly afterwards Caetano went to Pretoria to return the visit. At Beira the minister met the prime minister of Southern Rhodesia, Sir Godfrey Huggins, and important matters of mutual interest to the two territories were discussed.

Colonial Welfare.—The end of hostilities found the Portuguese colonies faced by grave difficulties in the matter of inland transport owing chiefly to shortage of rolling stock and tires. Although every effort had been made during the years 1939–45 to keep constructive activity in the African colonies at a high level, it did not always prove possible, owing to shortages of all kinds, to maintain the desired rhythm. Notwithstanding these difficulties, how-

Table II.—Portuguese Colonial Empire, Statistical Data—Africa

Item	1938		1941		1945	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
MOZAMBIQUE						
Exchange rate						
United States		1 Portuguese escudo = 4.42 cents		1 escudo = 4 cents		1 escudo = 4 cents (1945)
Great Britain		110 escudos = £1		100 escudos = £1		100 escudos = £1
Finance						
Government revenues	\$25,756* (£5,268)		\$22,083 (£5,477)		\$25,038 (£6,213)	
Government expenditures	\$25,756* (£5,268)		\$23,140 (£5,739)		\$24,668 (£6,121)	
Transportation						
Railroads		1,229 mi.†				1,408 mi.
Highways		17,222 "				"
Navigable waterways (rivers)		814 "				"
Airways		"				2,076 mi.
Minerals						
Gold		10,547 oz.		7,161 oz.‡		7,577 oz.§
Cement		26,783 tons		"		"
Coal		11,023 "		7,491 ‡		17,426 tons§
Crops						
Coconuts		79,759 tons		26,363 tons‡		"
Sugar cane		72,458 "		77,850 " ‡		"
Corn		29,111 "		31,595 " ‡		"
Exports						
Total	\$13,384† (£2,738)	...	\$11,347 (£2,814)	265,000 tons	\$22,036 (£5,468)	344,000 tons
Raw materials for industry	\$9,373† (£1,917)	...	\$5,027 (£1,247)	168,000 "	\$13,955 (£3,463)	245,000 "
Food products	\$3,408† (£697)	...	\$2,659 (£659)	94,000 "	\$4,280 (£1,062)	96,000 "
Imports—total	\$20,280† (£4,148)	...	\$17,492 (£4,338)	303,000 tons	\$30,757 (£7,632)	308,000 "
Cotton cloth, thread, etc.	\$4,265† (£872)	...	\$3,128 (£776)	3,000 "	\$8,711 (£2,162)	3,000 "
Machinery and apparatus	\$3,433† (£702)	...	\$1,170 (£290)	2,000 "	\$2,089 (£518)	3,000 "
Beverages	\$1,621† (£332)	...	\$1,574 (£390)	11,000 "	\$2,340 (£581)	10,000 "
Defense						
Standing army personnel		3,131				
ANGOLA						
Finance						
Government revenues	\$8,744 (£1,789)					
Government expenditures	\$7,518 (£1,538)					
Transportation						
Railroads		2,080 mi.				
Highways		40,205 "				
Waterways (rivers)		696 "				
Minerals						
Diamonds		651,265 carats		785,000 carats?		
Crops						
Sugar cane		1,070,995 tons		359,364 tons		
Corn		287,149 "		359,364 "		
Sea products						
Total				51,734 tons		
Chicharro				17,339 "		
Corvina				4,376 "		
Exports—total	\$14,987 (£3,065)	306,000 tons			\$24,492 (£6,070)	330,000 tons
Diamonds	\$4,408 (£902)	671,000 carats			\$4,045 (£1,002)	808,000 carats
Corn	\$3,033 (£620)	142,000 tons			\$2,272 (£563)	80,000 tons
Sugar	\$1,649 (£337)	35,000 "			\$2,249 (£557)	53,000 "
Coffee	\$1,630 (£333)	19,000 "			\$3,136 (£777)	26,000 "
Imports—total	\$10,267 (£2,100)	90,112 tons			\$15,523 (£3,847)	71,470 tons
Cotton cloth	\$2,034 (£416)	2,173 "			\$2,496 (£619)	831 "
Wines	\$839 (£172)	1,736,403 gal.			\$1,972 (£489)	2,259,894 gal.
Automobiles and trucks	\$370 (£76)	505 "			\$243 (£60)	142 "
Gasoline	\$348 (£71)	1,855,462 gal.			\$524 (£130)	1,975,276 gal.
Defense						
Standing army personnel		4,138				

*Budget estimate. †1939. ‡1942. §1944. ¶1937. ¶1940.

Item	1938		1941		1943	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
PORTUGUESE GUINEA						
Finance						
Government revenues (estimate)	\$1,159 (£237)					
Government expenditures (estimate)	\$1,159 (£237)					
Crops						
Groundnuts (exports only)		34,722 tons				
Palm kernels		6,614 "				
Forest products						
Palm and palm kernel oil		7,606 tons				
Exports—total	\$1,419 (£290)		\$2,601 (£645)			
Groundnuts			\$1,251 (£310)	38,000 tons		
Palm nuts			\$738 (£183)	16,000 "		
Rice			\$218 (£54)	6,000 "		
Imports—total	\$1,301 (£266)		\$1,971 (£489)			
Cotton manufactures			\$964 (£239)	777 tons		
Tobacco			\$123 (£31)	292 "		
Mineral fuel			\$81 (£20)	1,102 "		
Defense						
Standing army personnel		287				
Exchange rate						
United States		1 Portuguese es- cudo = 4.42 cents		1 Escudo = 4 cents		1 escudo = 4 cents (1945)
Great Britain		110 escudos = £1		100 escudos = £1		100 escudos = £1
CAPE VERDE ISLANDS						
Finance						
Government revenues	\$1,004 (£205)		\$648 (£161)		\$877 (£217)	
Government expenditures	\$596 (£122)		\$761 (£189)		\$605 (£150)	
National debt	\$1,428 (£292)		\$1,291 (£320)		\$1,291 (£320)	
Exports—total	\$5,257 (£1,075)	596,096 tons			\$1,179 (£292)	63,313 tons
Fuel oil (total for ship's supplies)	\$4,006 (£819)	411,555 tons			\$743 (£184)	31,626 "
Coal (total for ship's supplies)	\$971 (£199)	125,029 "			\$120 (£30)	5,412 "
Oil seeds	\$43 (£9)	2,204 "			\$44 (£11)	1,056 "
Fish	\$39 (£8)	341 "			\$1 (*)	15 "
Imports—total	\$4,785 (£979)	599,494 "			\$2,376 (£589)	44,944 "
Petroleum products	\$2,772 (£567)	452,270 "			\$277 (£69)	17,167 "
Coal	\$681 (£139)	137,041 "			\$190 (£47)	9,805 "
Cotton cloth	\$213 (£44)	259 "			\$294 (£73)	106 "
Defense						
Standing army personnel		147†				
SÃO TOMÉ AND PRÍNCIPE ISLANDS						
Finance						
Government revenues	\$544 (£111)		\$436† (£114)		\$463 (£115)	
Government expenditures	\$544 (£111)		\$424† (£111)		\$463 (£115)	
Crops						
Cacao		10,472 tons		9,965 tons†		
Copra		2,205 "		2,746 "		
Coffee		661 "		610 "		
Exports—total			\$1,597† (£417)	15,844 tons†		
Cacao			\$1,216† (£317)	7,685 "		
Palm nuts			\$117† (£31)	3,589 "		
Coffee			\$81† (£21)	557 "		
Copra			\$87† (£23)	2,340 "		
Imports—total			\$791† (£207)	10,505 tons†		
Cotton cloth			\$101† (£26)	119 "		
Fish			\$65† (£17)	1,214 "		
Wines			\$51† (£13)	546 "		
Defense						
Standing army personnel		145				
* (£248) † 1937. † 1940.						

ever, new aerodromes were constructed in Cape Verde, Guinea, Angola and Mozambique. In Angola, 14 light-houses (5 of them for both air and sea navigation) and 21 radio stations were set up; the port of Lobito (which had been completed in 1934) was provided with the necessary equipment, and the port of Luanda was built (completed in 1945). Improvements were also introduced in Angola's railway system and considerable work was done on the colony's vast network of roads (24,400 mi.). In Mozambique the new railways of the Limpopo valley, Tete and Nacala were built. The port of Lourenço Marques was enlarged, the length of its quays providing berths for shipping being 1.14 mi. in 1946, with a further 330 yd. under construction.

Numerous scientific missions were constantly at work in the various colonies. The year 1941 saw the creation of the Angola geographic mission (covering the geodesic network, astronomic observation and the preparation of a map of the colony to the scale of 1: 250,000); in 1936 the Angola hydrographic mission was set up to revise the hydrographic maps and charts of the coast; the Mozambique geographic mission, created in 1932, was expected to complete in 1947 the map of the colony to the scales of 1: 250,000 and 1: 500,000; the Mozambique mission, set up in 1929, nearly concluded the charting of the coast; in 1936 the Mozambique anthropological mission was created and in 1937

the Timor geographic mission, in 1942 the Mozambique botanical mission, in 1944 the Portuguese Guinea geo-hydrographic and zoological missions, in 1945 the Portuguese Guinea anthropological mission, etc. These missions were organized in Lisbon by the Colonial Investigations board and their cost was met partly by the mother country and partly by the colonies. Besides the scientific missions many others were organized to carry out economic surveys and public works of various kinds.

Special attention was paid to the problem of public health. In 1940 there were throughout the colonial empire 2,533 health officers, and the health budgets of the three main colonies (Guinea, Angola and Mozambique) totalled 50,000,000 escudos. By 1946 the number of health officers had risen to 3,744 and the health budgets of the 3 colonies mentioned had increased to a total of 97,500,000 escudos. In 1946 there were 369 qualified doctors and a 1,032 nursing staff employed in the health services of the Portuguese colonial empire. In addition, numerous doctors were employed by private concerns compelled by law to provide medical assistance to their native employees, and there were also doctors practising independently. Goa in Portuguese India had its own school of medicine and surgery and there were schools of nursing in all colonial capitals.

The work of these health services was directed toward the prevention and cure of disease. Special organizations

fought sleeping sickness in Angola, Mozambique and Guinea. In the latter colony the work was under the direction of the Institute of Tropical Medicine, which, for 50 years had been engaged on the treatment of trypanosomiasis, and was responsible for its total extinction in the island of Principe, having also originated the use of arsenic products in the treatment of the disease. In southern Angola, a permanent service for the surveillance and prophylaxis of bubonic plague was established.

Much attention was given in all the colonies to the fight against malaria. In the African colonies and in Timor strong measures were taken to combat filariasis, intestinal parasitosis and ulcers, all of which were widespread among the natives. The diet of the natives was generally defective and, in some regions, gave rise to vitamin deficiencies. The health services strove to improve conditions. Official tables of food values were set up, to be adhered to in the diet of those working for private employers. For their part, the agricultural services endeavoured to stimulate the growing of vegetables rich in vitamins. In Macao the government provided a special service for the cure of opium addicts. The opium trade was totally forbidden in the colony in 1945. There were no organized autonomous or separatist movements in the colonies during the decade. Political agitation in regard to Gôa was solely the work of a small minority of Gôanese in Bombay. The organic charter of the colonies, reformed by parliament, in 1946, enabled the colonial minister to increase local powers considerably in the light of the possibilities and of the degree of social development attained in each territory. By the

same measure natives were given representation on the various government councils. Education, health and well-being of the native peoples constituted the fundamental concern of the Portuguese government and inspired its laws and administrative measures. (J. M. R. D. S.)

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Portuguese Literature

More was written and published in Portugal during the period 1937 to 1946 than ever before, although, as everywhere, quantity and quality did not always coincide. The Portuguese being a people of profound lyrical inspiration, the main intellectual activity was in the field of poetry. Thus, great poets like Affonso Lopes Vieira and Teixeira de Pascoas—both belonging to the *renovamento* ("renovating") and nationalistic movement in Portugal—maintained in their prose works all the lyric or symbolic essence of their previous poems. Poetry still provided the fulcrum for literary production, whatever the genre cultivated. In poetry, whether remaining faithful to tradition or seeking to create new forms, the following, among many others, deserved mention: Alberto de Serpa, Antonio Correia de Oliveira, Cabral do Nascimento, Carlos Queiroz, Fernanda de Castro, João de Castro Osório, José Régio, Natercia Freire, Pedro Homem de Mello, Vir-

Portuguese Colonial Empire: Statistical Data—Asia

Item	1938		1940	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
MACAO				
Exchange rate		1 pataca = 28.77 cents* (2s.)		
Finance				
Government revenues	\$1,623 (£332)			
Government expenditures	\$1,623 (£332)			
Exports—total	\$5,967 (£1,220)	...		
Lumber	\$467 (£96)	...		
Fish (fresh and salted)	\$372 (£76)	...		
Swine	\$279 (£57)	...		
Defense				
Standing army personnel				532
PORTUGUESE INDIA				
Exchange rate		1 India rupee = 36.6 cents* (1s. 6d.)	1 rupee = 30.1 cents* (1s. 6d.)	
Finance				
Government revenues	\$2,329 (£476)		\$2,302 (£571)†	
Government expenditures	\$2,329 (£476)		\$2,302 (£571)†	
National debt	\$700 (£143)		\$797 (£198)†	
Minerals				
Manganese		10,448 tons		
Salt		32,548 "		
Exports—total				
Foodstuffs			\$772 (£202)	...
Raw materials of vegetable origin			\$317 (£83)	...
Chemical products			\$188 (£49)	...
Imports—total			\$59 (£15)	...
Cereals			\$3,894 (£1,017)	...
Minerals (excluding metals)			\$1,007 (£263)	...
Defense				
Standing army personnel				1,432
TIMOR				
Exchange rate		1 escudo = 4.42 cents		
United States		110 escudos = £1		
Great Britain				
Finance				
Government revenues	\$642 (£131)			
Government expenditures	\$642 (£131)			
Transportation				
Highways		551 mi.		
Crops				
Coffee (exports only)		1,102 tons		
Exports—total				
Foodstuffs			\$154 (£32)	...
Raw materials of vegetable origin			\$86 (£18)	...
Imports—total			\$40 (£8)	...
Cotton manufactures			\$144 (£29)	...
Foodstuffs			\$48 (£10)	...
Defense				
Standing army personnel			\$30 (£6)	...
*Portuguese escudo also used. †1943.				
				375

610 ginia Vitorino.

In the field of philosophic thought, there were representatives of the various European systems of philosophy, while its most original and national expression was to be found in the study and continuation of the work of Leonardo Coimbra and Sampaio Bruno, as exemplified by thinkers such as Alvaro Ribeiro, Augusto Saraiva, Delfim Santos, José Marinho and Sant'Ana Dionísio. Catholic philosophy had its most distinguished representatives in Diamantino Martins, João Ameal, Ilídio de Sousa Ribeiro and in Cardinal Gonçalves Cerejeira. A notable feature of Portuguese philosophy lay in its criticism of intellectualistic thought, in the forms of Cartesianism, positivism or materialism.

Criticism in its various branches acquired a constructive character in contrast with the intellectual defeatism of the second half of the 19th century, and was seeking the paths of a renovation of Portuguese culture. To this much was contributed by a revision of cultural values and the reflective consideration of the highest principles of criticism.

In this connection should be mentioned the work of such writers as Castelo Branco Chaves, Diogo de Macedo, Fidelino de Figueiredo, Hernani Cidade, João Gaspar Simões, Joaquim de Carvalho, José Osório de Oliveira, Luiz Cabral de Moncada, Mario de Albuquerque, Rodrigues Lapa and Vieira de Almeida.

In the realm of fiction the best work was to be found in the continuation of the national romantic tradition, the most fertile examples being of a predominantly stylistic character since writers who had attempted the social novel did not seem to have found or assimilated its genuine characteristics. In the first rank were the names of Aquilino Ribeiro, Vitorino Nemésio and the Catholic novelist Francisco Costa. Colonial literature, continuing on a different plane the work of the voyagers of the 15th and 16th centuries, sought to throw light on Africa and on the soul of the Negro. In this genre the names of Castro Soromenho, Ferreira da Costa, Guilhermina de Azeredo and João de Lemos were prominent. In journalism, whether in the field of reporting or in that of commenting, the following were outstanding: Antonio Ferro, Augusto de Castro, Augusto Pinto, Artur Portela, José Augusto, Luiz Forjaz Trigueiros, Luiz Teixeira, Norberto de Araujo, Joaquim Manso, Correia Marques. While the theatre had not yet fully recovered the glorious tradition of Gil Vicente, D. Francisco Manuel de Mello or Almeida Garrett, the well-known dramatists Eduardo Schwalbach and Júlio Dantas continued to show that they were still at the height of their powers. (R. V. A. M.)

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Portuguese Possessions in Africa

See PORTUGUESE COLONIAL EMPIRE.

Postal Savings

See BANKING.

Postal Union, Universal

See INTERNATIONAL ORGANIZATIONS.

Postal Unions of the Americas and Spain

See INTERNATIONAL ORGANIZATIONS.

Post Office

In any evaluation of the work performed by the United States postal service for the decade 1937-46, the duties rendered by it for the period covering World War II must, of necessity, be given generous treatment.

As far back as 1938, systems were devised for co-operation between the post office and the war and navy departments for the handling of mail for the armed services in the event of war. When World War II did come, the post office department had ready well trained postal experts who were inducted into the armed forces to take charge of mail handling. How efficiently this stupendous task was performed against what seemed at the start to be insurmountable obstacles, was clearly proved by the official records.

The army postal service was in operation in 55 foreign countries, and it provided mail facilities for the military personnel through 800 army post offices outside the continental United States. Its overseas service during World War II sold more than \$1,500,000,000 worth of money orders, an average of approximately \$55,000,000 each month. More than \$100,000,000 worth of postage stamps and stamped envelopes were sold through overseas army post offices. More mail was dispatched overseas than in any period in U.S. history. From 22,000,000 pieces of mail in July 1942, the volume rose steadily to more than 266,000,000 pieces in March 1945: equivalent to more than 50 pieces of mail each month for each soldier overseas.

The army postal service took over the courier service in May 1942, which was designed to provide a speedy and safe means of delivering highly classified official matter. In June 1945, there were 7 international routes covering more than 92,000 mi., and 319 officer couriers were handling more than 2,000 lb. of material each month.

The postal service also operated the V-mail service. This system grew to a world-wide network of stations which, prior to discontinuance on Nov. 1, 1945, had microfilmed more than 1,250,000,000 letters. V-mail contributed to the war effort as it released valuable cargo space on planes and vessels and permitted the expeditious movement of regular mail. V-mail and air mail were carried to distant places in from 6 to 12 days. The service between the United States and China averaged 12 days; between the United States and India 10 days; to New Guinea 9 days; to Egypt 7 days.

U.S. Nonmilitary Developments.—The ten years 1937-46 marked an era in the post office department unmatched in any other similar period of its history. The postal revenues reached a peak in 1945 of \$1,314,000,000 and increased from \$726,000,000 in 1937 to \$1,224,000,000 in 1946. During the same period, the total amount of mail handled increased from 25,801,000,000 to 36,149,000,000 pieces. Letters and postal card. increased from 14,049,000,000 to 19,300,000,000. Newspaper mail increased from 4,500,000,000 pieces to 5,865,000,000. Circular and advertising matter increased from 5,355,000,000 to 6,220,000,000 pieces. The number of parcels increased from 684,000,000 to 949,000,000. While registered mail decreased from 114,719,000 pieces to 97,000,000, insured mail increased from 83,073,000 to 137,000,000 pieces. C.O.D. transactions increased from 33,358,000 to 52,000,000; there was an increase in special delivery transactions from 87,224,000 to 106,000,000. Money orders increased from 247,334,000 to 272,000,000, and the number of depositors in postal savings banks increased from 2,791,000 to 4,115,000; the amount to the credit of depositors increased from \$1,267,000,000 to \$3,110,000,000.



Loading first class mail onto a commercial plane at the Chicago airport during the railroad strike in 1946

Notwithstanding wartime impediments such as dislocated transportation systems, restricted equipment and supplies and the loss of nearly 60,000 experienced postal employees who joined the armed forces, regular postal service was continued to 140,000,000 citizens without embargoes on any class of mail and without serious delays. Vast migrations of workers necessitated the establishment of postal facilities in what had formerly been wildernesses. Wartime conditions brought about almost daily changes in transportation problems and mail distribution and delivery methods, but mails were handled with "certainty, security and celerity."

During these eventful ten years, a number of improvements were made in the postal service. A postal delivery zone system was placed in operation in 1942 at 124 of the larger post offices. Approximately 40% or more of the mail bore zone numbers. Postmasters reported that during Christmas periods, when the percentage of the zone mail was even greater, the system especially proved its practicability by enabling inexperienced substitute employees to perform distribution, resulting in prompt deliveries.

Highway post offices were established in 1941, large motor buses being built with all the equipment of a railway post office to provide postal service among cities and towns usually served by side line railroads that had been discontinued. The first route, established between Washington, D.C., and Harrisonburg, Va., proved so successful that additional routes were established the same year between Indianapolis and South Bend, Ind., and between San Francisco and Pacific Grove, Calif. These three routes were operated by the post office department itself.

The first highway post office to be operated by a contract carrier began service Sept. 9, 1946, between Union, Miss., and Mobile, Ala. The contract was awarded to the Gulf, Mobile and Ohio Railroad company, at \$30,000 annually. The company furnished the necessary equipment

and drivers and bore the cost of operation and maintenance; the route was 182.9 mi. in length, and the contract provided for one round trip daily except Sunday.

The postal note system was established Feb. 1, 1945, to supplement the money order service. Postal notes were limited to \$10 value, the fee being uniform at 5 cents. The service was developed particularly with a view to future improvements of the postal money order system by utilizing high-speed mechanical equipment, thus assuring greater accuracy and facility in the handling of the balance of individual items. During the first 5 months the postal note system was in operation in the fiscal year 1945, nearly 8,000,000 notes were issued; during the fiscal year 1946 more than 26,000,000 were issued.

During the years 1937 and 1942, the post office department had charge of moving by registered mail about \$22,000,000,000 worth of gold bullion to Fort Knox, Ky., from the assay office at New York city and the mint at Philadelphia, and to the mint at Denver from San Francisco. This vast undertaking was handled without the loss of a single dollar in value. One shipment of gold bullion from the New York assay office was started July 25, 1940, and was completed on Jan. 23, 1941. There were some \$9,055,884.651 of this shipment of precious metal transported between the two points. It weighed about 9,000 tons. The metal was shipped aboard 45 special trains, guarded by hordes of postal inspectors, secret service agents, police officials and army units. The registered mail cost about \$1,800,000.

In the year 1936 the post office department took over the problem of registering for the Social Security board more than 32,000,000 who were eligible for social security benefits, while in 1940 it handled the registration of aliens, and postmasters throughout the United States registered 4,889,770 noncitizens.

The work of the post office department's postal inspection service, generally referred to as the "eyes and ears" of the postmaster general, was outstanding during the decade. The transportation of 38,000,000,000 pieces of mail annually afforded many opportunities and temptations for committing depredations. When depredations, losses or irregularities occurred prompt and relentless efforts by inspectors were imperative to fix responsibility and take corrective action.

A ten-year investigation by postal inspectors concluded in May 1946, with the arrest of 71 persons operating an insurance swindle, was typical of frauds perpetrated through the mails. A group of unscrupulous lawyers, doctors and insurance agents conspired with policyholders in a scheme to submit total disability claims based on fake heart ailments. An estimated \$10,000,000 was filched from 32 prominent insurance companies.

It was conservatively estimated that, in the cases investigated by inspectors during the ten years, \$586,000,000 was filched from the public. As a result, there was an average of 4,341 arrests, 3,717 indictments and 3,699 convictions for each year of this period. During the 10 years postal inspectors handled a total of 1,314,469 assignments in connection with which a total of \$5,953,192 in money was recovered.

During the decade, great strides were made in the development of the air mail service, both in the United States and in other countries. While in 1937 U.S. foreign air mail service consisted of routes to Mexico, Central and South America and the West Indies, with one transpacific route, one from New York to Montreal and from Seattle to Vic-

toria, B.C., there was communication by air with practically every civilized country on the globe in 1946.

In the international service, the United States had direct contact by air with all of Central and South America, with Eire, England, Norway, Sweden, Denmark, the Netherlands, France, Portugal, Italy, Greece, Egypt, Saudi Arabia; Alaska, Hawaii, New Zealand—a total of about 211,000 route miles. All planes on these routes were American owned. In addition, the United States mails were being carried to some foreign lands by air lines not operated by the U.S. government.

In the U.S. domestic air mail field, establishment of new routes throughout the country and extensions of those in existence showed great progress in the ten-year period. While for the calendar year of 1937 there were but 13,396,060,117 air mail pound miles flown, in 1945 the number had jumped to 130,191,098,000. The air mail load per mile flown in 1937 was 319; by 1945 it had increased to 747 lb. The air mail pound miles per route mile performed on the domestic routes in 1937 were only 429,834, while this figure had increased to 2,170,600 miles by 1945. The total air mail pound miles performed in 1937 was 12,732,530,874, while for 1945 this had increased to 123,396,453,046. Route miles covered in the domestic field for the fiscal year 1937-38 numbered 33,655; in the fiscal year 1944-45, 56,849. The monthly average of passengers carried over U.S. domestic lines increased from 91,892 in 1937 to 625,211 in 1945. Total passenger miles flown rose from 476,603,165 in 1937 to 3,500,102,057 in 1945.

Exhaustive tests made by the post office department at Los Angeles, Calif., and Chicago, Ill., proved the practicability of the helicopter for carrying mail. Pickup was effected by the helicopter's slowing down and having a tilting device bring the mail sack into the aircraft. Deliveries likewise could be made without stopping.

The U.S. post office department was quick to conduct experiments with the flying post office and the flying mail car in order to speed up the domestic air mail service. The flying post office distributed and handled mail in the air.

The flying mail car was especially designed as an air post office and was equipped with all facilities for handling and assorting mail in flight. Normally, such work was done on the ground. One such car was operated from New York to San Francisco. The route taken on the historic flight was the same over which the post office department had pioneered coast-to-coast air mail service in 1930. Elapsed transcontinental time for letters, carried by planes in daylight and trains at night, was approximately three days; in 1946, coast to coast flights were made in approximately 12 hours.

Air mail postage rate of five cents an ounce between all United States territory and members of the armed forces abroad was in effect. The old rate was six cents a half ounce. A reduced domestic rate brought an unprecedented air mail volume. With members of the United States armed forces stationed in all parts of the world, the post office department, on Dec. 23, 1941, established a rate of six cents a half ounce for air mail to or from the armed forces. Such mail otherwise would have been subject to much higher foreign air mail rates. The new law treated all air mail destined to United States territory as domestic mail, and extended this principle to members of the United States armed forces regardless of where they were located. It also covered civilian personnel authorized to receive mail through army or navy post offices.

The post office department cited examples to illustrate

the effect of the new five cent U.S. flag rate. The old air mail postage between the United States mainland and the Canal Zone was 10 cents a half ounce; Canton Island, 25 cents; Guam, 35 cents; Hawaii, 15 cents. The old air mail rate between Puerto Rico and Guam was 43 cents a half ounce and between Guam and the Canal Zone, 45 cents a half ounce.

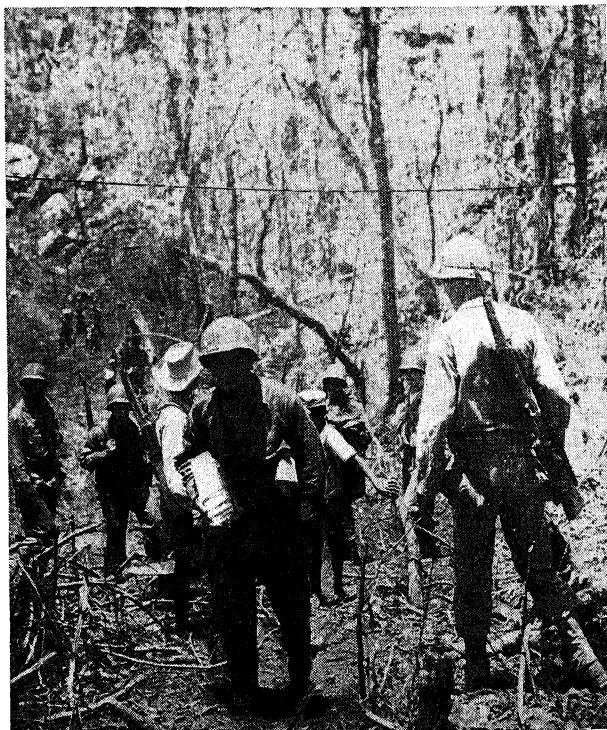
Great progress was also made by the railway mail service in the distribution and transportation of transit mails. During normal years, the volume of mail transported and distributed had increased tremendously, but during World War II mail for the armed forces overseas and in military camps taxed all available facilities and manpower to the limit. The inauguration of high-speed streamlined trains by railroad companies necessitated revision in the plans and specifications for railway post office cars, in order to meet changed operating conditions and improve working conditions within these cars.

There were no material changes in the conditions governing the acceptance of the low rates of postage of newspapers and other periodical publications admitted to the second-class mail privilege. On mailings outside the country of publication, a flat rate of postage of one and one-half cents a pound generally was applicable to the reading portion of such publications with a graduated zone rate of from one and one-half to seven cents a pound based on the advertising portion of such publications and the zone to which sent.

During World War II, co-operation was given the war and navy departments in efforts to get to the service personnel desired reading matter in newspapers and periodical publications admitted as second-class mail matter. Assistance also was rendered the department of justice in connection with seditious matter in the mails.

In 1937 the weight of mailings under the second-class mail privileges amounted to 1,335,224,538 lb., on which postage of \$22,525,429.55 was paid. For 1945 mailings weighed 1,379,374,594 lb., on which \$25,348,889.13 was paid.

Mail deliveries on the Luzon jungle trails in 1945 were made by U.S. troops, accompanied by armed guards and Filipino guerrillas



The United States Philatelic agency, established Dec. 1, 1921, reported total sales of \$15,870,004 for the period 1937-45. The number of orders handled for this period was 1,112,387, an average of \$14.26 an order. The turnover in actual stamps to obtain this figure amounted to approximately 950,000,000 specimens, by far the larger percentage of which was transferred to postmasters as being unsuitable for philatelic purposes.

The most phenomenal increase in the business of the agency was in the fiscal year ending June 30, 1946, when stamps to the value of \$3,030,692.36 were disposed of for collection purposes. During the period 1937-46, 160 new stamps were issued, divided as follows: commemoratives 115; regular 32; air mail 11, and special delivery 2.

Sweeping reductions in air mail rates to foreign countries became effective Nov. 1, 1945. These reductions, generally, were broken down into geographical areas to all parts of the world. As an example, rates to South America were reduced from 15 cents and 20 cents a half ounce to 10 cents a half ounce; Europe from 30 cents to 15 cents; and Africa, Asia and the far east from a maximum of 70 cents down to 25 cents. (L. Gc.)

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Great Britain.—The business of the post office grew very rapidly during the years 1937-46, in spite of the fact that World War II necessitated a number of restrictions on its services and put a stop to plans of development. Major G. C. Tryon (later Lord Tryon) was the postmaster general in 1937, and his successors were W. S. Morrison (1940-43), Captain H. F. C. Crookshank (1943-45) and, from 1945, Lord Lisio well.

The total of transactions with the public was £3,157,945,000 in 1945-46 (year ended March 31) or more than 3 times the total of £961,948,000 for 1936-37; the sharpest rise was in 1940-41, when transactions amounted to £1,672,088,000 or more than 40% over 1939-40. Improved facilities offered by the post office and the general expansion of trade and industry probably accounted for the increase between 1937 and 1940, but the largest items contributing to it after 1940 were the growth of post office savings bank business, and of that conducted on behalf of other government departments, especially those concerned with the payment of war pensions and allowances. Excluding the value of these agency services, as well as wireless licence revenue, accounts from 1937 to 1946 showed an excess of income over expenditure, though there was a decline from a surplus of £12,306,769 in 1936-37 to one of £7,426,841 in 1939-40. Postal and telecommunication tariff increases and surcharges introduced after the budget of 1940-41 contributed substantially to the revenue, and in 1941-45 they yielded £142,800,000 out of surpluses totaling £158,550,000.

Table I.—British Post Office Transactions, 1936-46.
(Thousand £)

1936-37	961,948	1941-42	2,000,973
1937-38	1,026,064	1942-43	2,138,221
1938-39	1,062,177	1943-44	2,477,883
1939-40	1,184,500	1944-45	2,566,107
1940-41	1,672,088	1945-46	3,157,945

The volume of postal traffic in general grew steadily from 1937 to 1940, but during World War II the number of letters delivered fell, mainly because of a reduction in circular advertising and football pool traffic, while the volume of parcel traffic showed a sharp increase. Overseas

Table II.—British Postal Traffic, 1938-46
(In thousands)

	1938-39	1943-44	1944-45	1945-46
Letters and packets delivered	8,150,000	6,270,000	6,250,000	6,230,000
Parcels handled	184,832	235,301	284,010	257,331

mails were necessarily less expeditious during World War II and in some cases normal air mail services were suspended. Included in the 1940-41 budget surcharges was the advance in the inland letter rate from 1½d. to 2½d. and in the post card rate from 1d. to 2d. (May 1, 1940).

Between 1937 and 1939 the net increase in the total number of telephones was about 8% yearly, but saturation point was still a long way off when war difficulties reduced the rate of installation. Development was resumed in 1945, by which date there was a long waiting list, and by 1946 there were nearly 4,000,000 telephones in Great Britain as against 2,600,000 in 1936. They were being installed, in the face of a shortage of labour and materials, at the rate of 70,000 a month or twice the prewar rate. This development was part of a program involving an expenditure of £10,000,000 in 1945-46 and £17,000,000 in 1946-47. The increase in the number of calls, which was 6% per year in 1934, had risen to 9% per year by 1938, when there were 2,236,000,000 originated effective calls. World War II arrested this rate of development and by 1943-44 traffic had fallen to 2,151,000,000. By 1946 it was in excess of the prewar figure and it was estimated that there were 8,000,000 calls a day. The rate of increase in the number of long-distance inland calls dropped in the first two years of the war, but there was a marked increase after 1941, and in May 1943 a system of rationing was introduced by the restriction of trunk calls to six minutes. In 1943-44 trunk calls totalled 180,689,000 compared with 99,776,000 in 1936-37. During the year 1938-39 the total number of inland telegrams handled was 50,395,000, and for 1944-45 the number was 62,953,000, an increase of 25% over the prewar figure. On May 1, 1943, greetings telegrams, which formerly totalled 160,000 weekly, were abolished as an economy.

The number of operative broadcast receiving licences in force on March 31, 1937, was 8,127,635, which had increased by the corresponding date in 1946 to 10,395,551 (on Dec. 31 of the same years the numbers were 8,479,835 and 10,740,350 respectively).

Remittance business increased 45% between 1939 and 1945. While government restrictions on football pool traffic by post caused a drop in postal order business after 1940, business in money orders and postal drafts doubled during World War II.

Table III.—British Postal Remittance Business.

	1936-37	1938-39	1944-45
Money orders	£65,246,000	70,984,000	147,418,000
Postal orders	£88,898,000	103,960,000	83,102,000
Postal drafts	£23,062,000	26,489,000	61,320,000

An important factor in the financing of the war was the work of the National Savings committee and the organization for small savings of the post office played a considerable part in the movement. Savings in the form of savings bank deposits, and purchases of savings stamps, savings certificates and defense bonds swelled enormously the transactions of the post office department. Deposits, which had amounted to £130,265,000 in 1936-37, reached £428,388,000 in 1944-45 and £647,588,000 in 1945-46 including £189,000,000 release benefits to service personnel; the amount due to depositors at the end of 1936 was £432,371,000, a figure which had grown to £1,776,622,000 by Dec. 31, 1945. There was an increase of 9,700,000 in the

number of depositors' accounts between 1939 and 1945. Savings certificates issued in 1936-37 totalled £25,851,000, but purchases in 1943-44 amounted to £310,404,000, and in 1944-45 to £288,988,000 falling to £204,211,000 in 1945-46. Savings certificates remaining invested at March 31, 1946, amounted to £1,603,724,000, as against £390,094,000 on March 31, 1937.

These figures indicate significant changes in the distribution of capital in Great Britain.

Excluding savings, agency business done on behalf of the ministries of health, pensions and national insurance and the service ministries contributed most to the sharp increase in business in 1940-46. By 1945 the post office was paying out in service pensions and allowances nearly £8,000,000 weekly. In Aug. 1946 the post office assumed the additional function of paying out family allowances.

Table IV.—Issue of Pensions and Allowances
(Numbers of Transactions)

	1938-39	1943-44	1944-45
War pensions and billeting allowances	46,285,000	315,075,000	341,094,000
Pension orders paid (old age, widows', etc.)	188,103,000	290,021,000	300,189,000

During World War II all post office services were harnessed to national defense needs, and work of telecommunication installation was largely restricted to that required for the provision of services for civil defense and the armed forces of Great Britain and the United States; the work done for the latter contributed to reverse lend-lease arrangements. The post office provided telecommunication services for the home defense forces, with alternative routes and circuits, and became fully responsible for all civil defense communications, including the conveyance of air raid warnings. It organized its own air-raid precautions services and provided a contingent of the home guard for the defense of the telecommunication system in the event of invasion. The demand of these and other wartime exigencies, such as release of staff for the forces, the reduction of railway services, evacuation and population movements, the black-out, etc., threw an immense strain on its organization, and it was necessary to reduce postal collections and deliveries, place restrictions on trunk telephone services between 1943 and 1945 and in the interests of economy discontinue certain facilities. These difficulties were multiplied by the onset of aerial warfare in Sept. 1940. Much damage to post office property was sustained, but in spite of dislocations vital services were never interrupted. Their maintenance involved a great deal of immediate repair work and rapid adaptation to changing conditions. The most destructive raid to post office property took place on the night of Dec. 29-30, 1940, when the central telegraph office in London, through which more than a quarter of the telegraph traffic of the country passed, and the Wood street building, which housed three automatic telephone exchanges, were destroyed.

During the years of World War II many foreign telegraph and telephone services had perforce to be suspended. In spite of the destruction of equipment in the occupied countries, services with these countries were rapidly restored as they were liberated and the development of new types of services, suspended during the war, was resumed.

Radio telephone services were also resumed with most parts of the world.

In addition to the maintenance of home postal services the post office handled very large mails for the navy, army and air force as well as for prisoners of war. Mails for the

army and air force were dealt with at Nottingham, the main centre of the army post office (A.P.O.), and more than 1,000,000 parcels, 2,750,000 newspaper packets and 9,000,000 letters were dispatched from there weekly. Various concessions, including free postage for surface letters up to 2 oz. in weight, were allowed to members of the forces serving overseas. With the entry of Italy into World War II in 1940, the Mediterranean was closed to shipping and mails for the middle east, India, etc., had to go via the cape. To provide speedier postal communications an air-graph service was instituted in April 1941 between the United Kingdom and the middle east; it was later extended to Canada, East and South Africa, India, Australia and New Zealand, and by the time the service was withdrawn in July 1945 more than 330,000,000 airgraphs had been sent from or received in Great Britain. Another facility was the air post card, which was superseded in Dec. 1942 by the air letter, of which 3,000,000 weekly were being dispatched by 1945.

The post office was the largest single employer of labour in Great Britain, and in June 1946 the number of men and women in its service totalled 338,000. Its wage bill for 1945-46 was £77,900,000. About 80,000 members of the post office staff went on active service during World War II, of whom more than 4,000 were killed. More than 400 civilian workers lost their lives in post office service and many more were injured. Nearly 900 military and civil awards were conferred on post office workers up to the end of 1946. Trade unionism continued to play a growing part in the organization of post office staff. The two largest unions covering the service were the Union of Post Office Workers, which had a membership of 124,909 in 1939, increasing to more than 150,000 by 1946, and the Post Office Engineering union, the membership of which increased from 34,360 in 1939 to 45,663 in 1946.

The post office was responsible for the introduction of a number of technical improvements, the most notable being in connection with long-distance telephony. A special type of cable containing four separate coaxial pairs of conductors was completed between London and Birmingham in 1938—the first of its kind, it is believed, to operate commercially. These four coaxial pairs enabled the cable to carry 1,200 simultaneous conversations. A great advance in overseas telephony was made possible by the British-invented submarine repeater, an amplifying device capable of working on the sea bed without attention for at least five years, which doubled the number of circuits a cable could carry. The first of these repeaters was connected to the Belfast cable in 1943. In 1945 the telegraph cable-laying ship "Monarch," with a gross tonnage of 8,200 tons and capable of laying a cable across the Atlantic in one voyage, was launched. Also in 1945 the post office provided for the war department the longest submarine telephone cable in the world, that between Lowestoft and Borkum (northwest Germany). In 1946 this cable was equipped with a submerged repeater which increased the circuit capacity of the cable from 1 speech circuit and 16 telegraph circuits to 3 speech circuits and 36 telegraph circuits. (See also PHILATELY; PHOTOGRAPHY.) (W. F. H.)

Potash

French and German mines kept output of potash at high levels until the closing stages of World War II. The Polish fields and much of the German producing area then passed under Russian control.

Potash production in the United States made a new record high in 1945, for the 12th successive year, with a total more than three times the 1937 level. In spite of

Table I.—World Production of Potash
(Short tons of K₂O content)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
France	539,916	641,314	659,200	588,600	793,700	718,700	786,200	558,900	?
Germany	2,169,807	2,402,896	2,272,672	2,276,801	2,393,512	2,291,468	2,300,125	2,122,533	?
Poland	110,165	119,438	?	?	?	?	?	?	?
Spain	57,224*	54,644*	28,138	98,826	129,000	98,827	95,900	127,900	126,800
U.S.S.R.	293,000	134,500	?	?	?	?	?	?	?
Palestine	20,100	32,032	35,014	49,031	56,041	57,400	51,700	?	?
United States	284,497	316,951	312,201	379,679	524,875	679,206	739,141	834,568	874,243
Total	3,470,000	3,701,775	?	?	?	?	?	?	?

*Crude Salts.

Table II.—Data of the Potash Industry in the United States
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Production, crude	486,090	534,945	546,757	658,249	986,458	1,267,455	1,428,840	1,578,498	1,588,305
K ₂ O content	284,497	316,951	312,201	379,679	524,875	679,206	739,141	834,568	874,243
Sales, crude	466,933	498,159	634,014	677,892	994,843	1,277,317	1,401,271	1,543,420	1,597,160
K ₂ O content	266,938	286,437	366,287	393,058	531,346	680,831	732,151	817,892	870,370
Imports, crude	810,529	450,387	255,812	289,037	62,295	21,328	45,428	19,141	17,212
K ₂ O content	351,445	193,609	100,129	118,690	15,818	3,359	17,109	4,868	6,022
Exports, crude	105,125	86,753	140,329	107,240	104,833	97,708	131,674	125,501	123,653
K ₂ O content	62,000	51,800	83,800	62,836	56,873	57,141	70,007	68,880	67,583
Available supply	1,172,337	861,823	749,497	859,689	952,265	1,200,937	1,315,025	1,437,060	1,490,719
K ₂ O content	556,383	428,246	382,616	448,912	490,291	628,049	679,253	753,880	808,809
Consumption, K ₂ O	476,979	467,542	387,424	449,376	490,531	627,294	678,131	752,319	807,038
Stocks, producers	105,900	158,540	54,233	35,060	26,374	14,158	43,591	76,123	68,796
K ₂ O content	55,620	87,440	29,440	16,370	9,712	6,041	13,984	29,763	34,253

the almost complete disappearance of imports, which furnished nearly two-thirds of the supply in 1937, domestic production kept pace with increasing consumption. During 1939-42, sales were in excess of production and stocks declined almost to the vanishing point, but they improved somewhat in 1943-45. (See also FERTILIZERS.) (G. A. Ro.)

Potato Beetle

See ENTOMOLOGY.

Potatoes

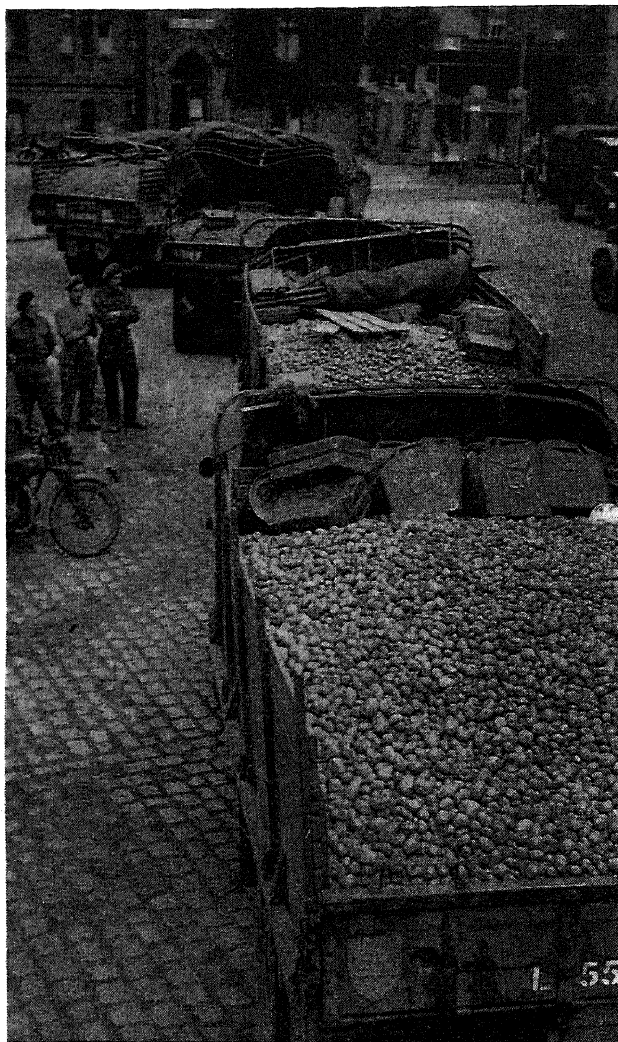
World production of potatoes was estimated by the United States department of agriculture at an average of 8,124,000,000 bu. for 1935-39, larger than the average for the preceding five years. After 1940, world statistics were incomplete and estimates were less reliable. In the prewar period 1935-39, the soviet union was first in production with about 2,000,000,000 bu., and Germany second with 1,040,000,000 bu. North America produced about 428,000,000 bu., South America 88,000,000 bu. and the rest was grown in many countries of Europe and Africa. Asia and Africa had never been important potato producers. The United Kingdom produced 182,600,000 bu., Canada 62,300,000 bu. and Ireland 98,288,000 bu. When the war began, Germany increased her crop to more than 2,592,000,000 bu. by 1942; the extent of the subsequent sharp decline in 1944-46 was unknown. Polish and soviet production also declined as the war devastation spread over these countries, but was reported as recovering rapidly in 1946. The output was adequate for the producers in most European countries, but surplus supplies for shipment to cities were very scarce. The losses of stored stocks and seed held in the bombed cities of Germany were felt by the city populations. The drought in the Mediterranean in 1944 reduced the crops of Italy and Spain. The Italian crop in 1945 was estimated at only 60% of the prewar average. Lack of fertilizer, work animals and seed were the principal causes of the decline in the crop. The output in Denmark, the Netherlands, Belgium and Switzerland was well maintained, but transportation facilities were lacking to move surpluses to other countries with crop deficits during most of the war period and after 1944.

United States.—The U.S. potato crop returned a total production of record proportions during the decade 1937-46 because of the higher yields harvested, although the acreage was below the prewar level. This was another example of the increased efficiency of farm methods aided

by a series of years of favourable weather. The 1943 crop of 464,999,000 bu. was an all-time high record. The previous record was made in 1928, when 427,249,000 bu. was harvested. The average for 1934-39 was only 375,091,000 bu.

During the decade 1937-46, crops were grown upon a smaller acreage than the average for the period between the two world wars. After 1900 the total area devoted to potato-growing had been close to 3,250,000 ac., the highest being in 1922, when 3,901,000 ac. were harvested. In 1937 the crop was grown on 3,185,000 ac., whereas in 1941, the area was only 2,711,000 ac. The yield increase was slow up to 1937, when it averaged 123.2 bu. per ac.—exceeded only once before, in 1924. The next increase in yield was in 1940, with 132.1 bu. per ac., followed by 1942, with 136.9 bu., 1943 with 139.6 bu. and the bumper record of 1945, with 150.6 bu. per ac. These rapid increases in yield were due to the use of more fertilizer and better seed varieties, and to generally improved cultural practices and shifts to the best soils. The latter change was stimulated during World War II by higher prices and labour shortage. The acreage was increased in the highest yielding states—those in the northeastern and northwestern areas, where summer temperatures are not too high and the water supply is ample. The lowest yields were grown in the dry plains and hot south. In ten of the best potato producing states acreage was increasing. Several areas had become outstanding in specializing in the potato crop. Kern county, California, increased acreage from 2,000 ac. in 1929 to 55,000 ac. in 1945; this one county produced more potatoes in one year, 1944, than did all potato states except the leading six. In the Klamath basin of Oregon and northern California, the increase was from 6,000 ac. in 1929 to 20,000 ac. in 1944.

The marketing of potatoes is a year-round operation since the early southern crop matures in winter or early spring and the harvest of the late crop is not finished until frost comes. Winter potatoes were grown in south Texas and Florida on an average of about 10,000 ac., yielding more than 1,000,000 bu. during the decade. The average price of this crop in 1933-42 was \$1.18 per bu., with a top of \$2.80 in 1944. The acreage of winter potatoes was greatly increased in 1946 to 15,300 ac., which brought a crop of more than 2,000,000 bu. The early spring crop, also from Florida and Texas, was grown on more than 28,000 ac., and the crop was about 3,000,000 bu. in 1943-46. The late spring crop was more widely distributed in 11 states from California eastward through the south. This



German-grown potatoes from Brunswick were brought into Berlin in 1945 by British army trucks, each carrying eight tons, to feed the city's inhabitants

crop covered about 205,000 ac. in 1943-46 and returned about 34,000,000 bu. The summer group of the early commercial potato crop, grown in nine states on the Atlantic seaboard and through Kentucky, Missouri, Kansas and Nebraska, averaged about 132,000 ac. and produced approximately 20,000,000 bu. in 1943-46. The intermediate and surplus late potato states produced the bulk of the larger crops of the decade. Production declined in the intermediate states, although prices rose higher than for the potatoes from the 30 late potato states producing the bulk of the surplus crop.

The prices of different crops of potatoes varied after 1937, but all increased after 1941 with the increasing war demand. Early potatoes advanced steadily until 1946, but the main crop declined after 1944. The season's average price of all potatoes at the farm rose from 52.9 cents per bu. in 1937 to \$1.49 per bu. in 1944, then declined to about \$1.35 per bu. in 1945-46. The wholesale price at New York advanced from 75 cents per bu. to \$1.95 in the same period. Futures trading in potatoes was begun in the Chicago Mercantile exchange in 1939, and was similar to futures trading in grains and cotton. A surplus of potatoes in 1940 led the government to buy 1,500,000 bu. for relief distribution and also made payments of 14½ cents per bu. for potatoes delivered to starch factories. In 1942, large quantities were diverted to livestock feeding and

almost 2,000,000 bu. were purchased by the government. The government called for an increased acreage in 1942 for starch, lend-lease and other domestic needs. Price supports were continued at 90% of parity by grades and regions, by purchases in the market, loans and by payments to producers. Prices of potatoes were above 100% of parity through most of 1945 and 1946.

Export shipments, formerly small, amounted to 2,097,000 bu. in 1945 and increased to about 14,000,000 bu. in 1946. Late potatoes were shipped to Canada, Belgium, France and United Kingdom. The U.S. consumer had almost a normal supply of potatoes throughout World War II, although large quantities were taken for the military forces and lend-lease. The prewar average consumption was 130 lb. per capita, 133 lb. in 1942 and 130 in 1945 and 1946. Military supplies in 1942 amounted to 26,900,000 bu.; in 1943, 29,900,000 bu. and in 1944, 33,700,000 bu.; they dropped sharply in 1945 and 1946. A large quantity was dehydrated for foreign shipment, amounting to 17,000,000 bu. in 1943 and 18,000,000 bu. in 1944.

Sweet Potatoes.—The sweet potato crop responded only slightly to the stimulus of World War II. This crop has increased in volume steadily but slowly from 1900, reaching high outputs in 1932 and 1935. The record crop of 1932 was 86,436,000 bu.; it was 83,128,000 bu. in 1935, after which year the average (1935-39) was 67,500,000 bu. Production declined from 1937 to 1942, then increased slightly in 1943, only to decline again to near the average of the decade in 1945. The big crop of 1932 was because of a record acreage of 1,056,000 ac. and a fair yield of 81.9 bu. per ac. Acreage was 840,000 ac. in 1937 and declined to

Table I.—U.S. Potato Production, 1937-46
(In millions of bushels)

	1937	1939	1941	1942	1943	1944	1945	1946*
U.S. Total . . .	394.1	363.1	357.7	379.6	464.9	379.4	425.1	445.0
Late potato states								
Maine . . .	47.6	37.2	45.3	45.4	72.7	52.2	52.7	64.5
Idaho . . .	30.3	28.5	28.5	30.3	43.4	39.1	44.2	42.4
New York . . .	28.3	26.7	28.0	27.3	29.6	26.4	28.9	31.6
North Dakota . . .	11.9	14.0	15.0	18.2	22.1	20.8	23.8	18.3
Minnesota . . .	24.8	20.3	17.9	19.3	23.5	15.3	19.3	15.8
Colorado . . .	15.6	14.4	12.7	16.4	18.5	20.0	19.1	19.9
Michigan . . .	28.6	24.2	20.6	17.2	22.3	19.5	18.7	16.8
Pennsylvania . . .	25.2	22.4	23.6	17.6	18.6	19.1	16.7	17.5
California . . .	18.1	11.5	11.4	11.5	11.4	11.3	13.9	13.0
Wisconsin . . .	18.0	17.3	11.4	11.5	16.3	11.8	12.1	10.6
Nebraska . . .	8.1	9.7	9.4	12.8	12.0	8.4	12.0	10.0
Washington . . .	9.4	7.3	8.6	8.6	13.2	9.8	11.8	12.3
Oregon . . .	7.8	7.2	8.4	7.4	11.6	10.3	11.3	11.4
Ohio . . .	10.0	12.6	13.0	9.7	8.5	5.8	7.1	6.2
Iowa . . .	4.9	5.6	6.0	7.0	5.3	2.4	3.9	3.9
Indiana . . .	5.4	4.5	4.3	5.7	4.1	3.1	3.9	3.7
Utah . . .	2.1	2.0	1.8	2.0	3.4	2.7	3.3	3.4
Connecticut . . .	2.8	3.2	3.4	3.0	3.1	3.4	3.3	3.3
South Dakota . . .	1.5	2.4	2.0	3.3	3.6	2.5	2.9	2.2
West Virginia . . .	3.2	3.0	3.9	4.1	2.7	2.0	2.8	3.2
Massachusetts . . .	2.2	2.6	2.7	2.9	3.3	3.1	2.7	2.9
Wyoming . . .	2.4	1.6	2.1	2.6	2.2	2.3	2.6	2.3
Illinois . . .	3.1	3.4	3.3	3.7	2.1	1.8	2.6	2.6
Montana . . .	1.9	1.5	1.8	1.6	2.6	2.5	2.0	1.9
Arizona . . .	.1	.2	.3	.5	1.1	1.3	1.6	1.6
Vermont . . .	2.1	1.9	2.0	1.5	1.8	1.6	1.3	1.4
Rhode Island . . .	.8	.7	.8	.9	1.0	1.2	1.2	1.5
New Hampshire . . .	1.4	1.3	1.4	1.2	1.4	1.0	.9	1.0
Nevada . . .	2.1	.2	.3	.3	.6	.5	.7	.6
New Mexico . . .	.4	.4	.4	.3	.4	.4	.4	.4
Intermediate potato states								
New Jersey . . .	10.4	7.4	9.7	10.3	11.4	8.8	12.5	12.5
Virginia . . .	10.9	6.7	7.0	7.6	9.5	5.9	8.5	10.8
Kentucky . . .	4.3	3.8	3.7	4.7	4.6	2.4	3.9	4.6
Missouri . . .	4.9	4.6	5.9	4.5	3.8	2.2	2.9	4.2
Maryland . . .	3.4	2.3	2.3	2.0	1.9	1.8	2.1	2.4
Kansas . . .	2.1	2.1	2.8	2.2	2.7	1.0	1.4	1.8
Delaware . . .	.4	.3	.3	.3	.3	.2	.3	.3
Early potato states								
California . . .	—	11.0	10.3	11.5	16.4	22.7	23.3	33.6
North Carolina . . .	9.5	8.2	6.7	9.2	12.1	6.9	9.2	10.9
Florida . . .	4.1	3.4	3.3	4.2	3.7	3.4	5.2	6.3
Alabama . . .	3.7	4.8	5.4	3.9	5.2	3.3	5.2	4.7
Texas . . .	3.4	2.6	6.0	5.5	6.3	5.4	4.6	5.6
Tennessee . . .	3.0	3.0	2.7	3.4	4.3	2.4	3.4	3.4
Arkansas . . .	3.0	3.0	3.1	3.4	4.5	3.4	2.7	3.9
South Carolina . . .	3.1	3.1	2.7	3.1	3.1	1.4	2.4	3.3
Georgia . . .	1.1	1.3	1.1	1.8	2.1	2.0	2.0	2.1
Mississippi . . .	1.5	1.4	1.3	1.9	1.9	2.2	1.9	2.2
Oklahoma . . .	2.5	2.2	2.1	2.3	2.5	2.0	1.1	1.7

*Preliminary estimate.

709,000 ac. by 1945. The top yield of 100.9 bu. per ac. had not been equalled after 1915; that of 1945 was 94.3 bu. per ac. Prices of sweet potatoes rose through the decade from a farm average of 82 cents per bu. in 1937 to about \$2.50 in 1946. The price was supported under the Steagall act at 90% of parity for two years after the war's end.

Only a small part of the sweet potato crop was used by the military forces—about 1,000,000 bu. in 1943-44, and about the same amount in 1944 and 1945. Another 1,000,000 bu. were dehydrated, and almost an equal amount was canned during the same three years. Per capita civilian consumption averaged 23.3 lb. in 1935-39 and during 1940-46 continued at about 20 lb. per capita. The leading sweet potato state was Louisiana, which grew 17% of the crop in 1945. The competition of other food and oilseed crops was considered the chief cause of the lack of expansion in total production during World War II. (See also VEGETABLES.)

Table II.—U. S. Sweet Potato Production by Leading States 1937-46
(In millions of bushels)

	1937	1939	1941	1942	1943	1944	1945	1946
U.S. Total	68.0	61.8	62.1	65.5	73.3	71.6	64.6	66.8
Louisiana	6.4	6.9	5.9	5.8	9.7	8.1	10.8	10.8
North Carolina	7.6	8.6	6.8	8.8	7.5	8.6	7.2	7.0
Georgia	8.5	8.8	1.2	8.0	9.3	8.2	8.0	6.8
Alabama	8.8	8.8	5.9	6.0	7.6	6.6	6.3	6.4
Mississippi	7.5	6.1	6.4	6.4	6.9	6.2	6.9	6.4
South Carolina	5.1	6.8	4.4	5.8	7.2	7.0	5.8	5.3
Texas	3.7	3.7	5.4	3.8	5.6	5.0	4.5	5.1
Virginia	5.0	4.1	2.9	3.8	2.9	3.9	3.4	3.7
Tennessee	5.6	3.7	4.4	3.6	4.7	4.1	2.8	2.7
Arkansas	3.5	2.6	2.1	1.7	1.6	1.9	1.9	1.9
New Jersey	2.4	2.3	1.8	2.7	1.4	2.4	1.7	1.8
California	1.2	1.2	1.5	1.2	1.2	1.2	1.0	1.2
Kentucky	2.1	1.9	1.3	1.6	1.8	1.4	1.2	1.2
Florida	1.3	1.1	1.2	1.1	1.6	1.4	1.1	1.1

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Potsdam Conference (1945)

See INTERNATIONAL CONFERENCES, ALLIED (WORLD WAR II); INTERNATIONAL LAW; UNITED NATIONS.

Pottery

See INTERIOR DECORATION.

Poultry

World production of poultry was reduced by World War II, particularly in Europe. North America and Europe produced about three-fourths of the world's poultry and eggs before the war. The increase in Canada and the United States nearly offset the losses in Europe, so that the 1946 world total was estimated to be only about 5% below the prewar 1934-39 average. The largest decreases were in the Netherlands, Norway and Finland where production of eggs was reduced to only 25% of pre-war, while in the United Kingdom the output was down about one-third. The heavy exports of Canadian and U.S. dried eggs helped to hold the consumption in the United Kingdom to near 200 eggs per capita. Australia increased poultry production during the war, but in China and other eastern areas there was a decided decline. Food was so scarce in many areas that all eggs were eaten, thus preventing an increase in flocks.

Although the poultry industry in the United States had been remarkably stable for a half century, it made many important changes during the decade 1937-46. World War II accelerated these changes, which were just beginning in the prewar period. The highly specialized commercial broiler business, improved egg production per hen, housing and control of diseases were each important factors. The number of chickens on farms, where most are raised, had increased slowly during the four preceding decades,

ranging between 350,000,000 and 475,000,000 head. A high point of production was reached in 1928, after which year there was a decline until 1935. In 1938, a total of 389,600,000 head was reported on farms on Jan. 1, which number increased steadily to a record of 576,000,000 head in 1944. This high record was followed by slight declines to 510,000,000 in 1945 and 525,000,000 head in 1946.

Table I.—Number of Chickens on Farms in United States 1937-46
(on Jan. 1)

1937	423,921,000	1942	474,910,000
1938	389,624,000	1943	540,788,000
1939	418,591,000	1944	576,441,000
1940	438,288,000	1945	510,939,000
1941	422,909,000	1946	525,536,000

A more accurate measure of poultry production was the number of chickens raised, because the chicken crop is hatched and marketed within the year and is not subject to count on Jan. 1 of each year. In 1937, poultry was at a low point; only 601,000,000 were reported as raised, the smallest number in 20 years. This low production was followed by a steady increase to the top of 934,000,000 head in 1943 and 821,000,000 head in 1945. Commercial broiler production had just begun to expand in 1937, when 67,915,000 were grown. This crop increased rapidly to over 312,000,000 birds raised and sold in 1945. These birds averaged 2½ to 3 lb. each; their total weight was a considerable addition to the nation's meat supply.

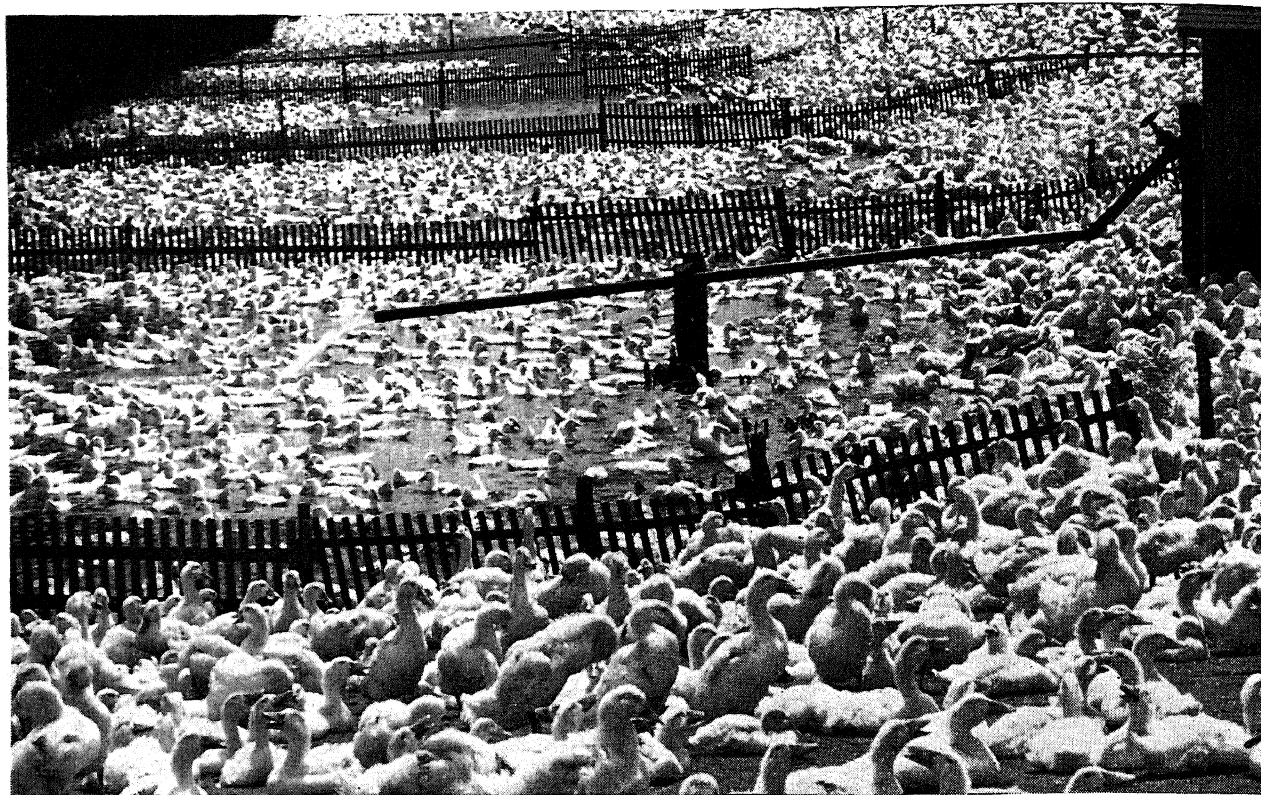
The increase in broiler chicks was one of the most outstanding gains of the decade. This industry began about 1925 in the "Delmarva" area of Delaware, Maryland and Virginia on the eastern shore to meet the growing demand for chicken meat in the eastern city markets. The egg farms had produced broilers as a side line, but the new demand called for more broilers than the egg farms could afford to produce; therefore specialized broiler farms were developed. About half the production was grown in the South Atlantic states in concentrated poultry areas. For example, Sussex county, Delaware, produced more than 73,000,000 broilers in 1945.

Total U.S. poultry production, (chickens and turkeys) averaged 2,675,000,000 lb. in 1935-39 and rose to a high of 4,380,000,000 lb. in 1945. The total for ducks, geese and other fowl, not reported annually, was small. This total for poultry meat compared with 22,891,000,000 lb. of all meats from animals in 1945.

Table II.—Poultry Meat Production in United States, 1937-46
(In Pounds)

1937	2,042,009,000	1942	2,807,355,000
1938	2,185,049,000	1943	3,410,150,000
1939	2,337,980,000	1944	2,665,112,000
1940	2,092,831,000	1945	3,700,000,000
1941	2,477,222,000	1946	3,150,000,000

The commercial hatching industry likewise made significant changes during the decade 1937-46. In 1937, the output of the hatcheries was about 687,595,000 chicks, approximately the same number as the average of the previous ten years. In 1939, the big increase began, and by 1943 the total output was 1,609,121,000 chicks. During this period the price of chicks had risen from \$8.80 per 100 to \$13.90 per 100 in 1943. The output of the commercial hatcheries had greatly reduced the "setting hen" and the small farm incubator, and in 1940 it was estimated that commercial hatcheries supplied 70% of the chicks raised on farms. The development of the hatcheries made a fine market for the eggs from well-bred flocks. The quantity of eggs needed was large, since only about 68% of the eggs set produced chicks. The broiler business made the de-



Duckling hatchery at Riverhead, N.Y.

mand for chicks more constant throughout the length of the year. By 1946, 20% of the hatchery output was in the last six months of the year, compared to only 5% in the 1930s. The development of a method of "sexing" chicks, to determine the sex before selling them, also brought new practices into action. Egg farms bought only pullets, and the males were sold to broiler plants. The development of broiler-raising centres led to the beginning of allied industries dealing in feed, dressing for shipment and special breeding and hatching farms. The specialized trades became so recognized as to be organized into labour unions.

The great increase in the rate of egg production per hen, from an average of less than 130 per year in 1937 to about 150 per year in 1946, led to less meat output in relation to eggs produced. The purchase of pullets from sexed flocks by farmers lessened their output of surplus males. A part of the increased demand for meat was made up by the increase in turkeys, which furnish a much larger output of meat per bird.

The marketing of poultry products underwent important changes in the decade. The improvements in dressing and freezing poultry fully prepared for the consumer required the development of a new type of dressing plant, many of which were operated as co-operatives owned by producers. The poultry-feeding plants near large cities were disappearing. The quality of the poultry meat output increased steadily as government standards for grading and inspection were introduced by the extensive buying for military and lend-lease uses. Since the government prices and OPA ceilings were based upon grade, the use of grades became necessary.

Egg production on farms increased more than 50% during the decade 1937-46, from 37,564,000,000 in 1937 to 57,874,000,000 in 1944, the high record of the period. About a third of this increase was due to the rise in rate of output per laying hen mentioned above. The latter increase in turn was due to better breeding and feeding; many individual farms adopted the methods which

had enabled commercial farms to reach higher production years before. The National Poultry Improvement plan, inaugurated by the U.S. department of agriculture, was in operation in 1936-47 in 41 states with 30,558 flocks participating in supplying 1,239 hatcheries. High records of performance were made by 22,322 hens. By 1944-45, 73,578 flocks supplying 3,181 hatcheries were listed, and records of high performance on nearly 50,000 hens showed an average production of about 175 eggs per year. The United States register of merit in 1943-44 listed 2,873 hens with daughters which averaged 208 eggs per year. The production of eggs per capita for the United States as a whole rose from 319 in 1937 to 458 in 1944, then declined to 431 in 1945.

Another great change in the poultry industry during the decade was the expansion of the egg-drying method of marketing the products. In 1937, the total output was 2,291,000 lb.; in 1944 it was 320,742,000 lb. This form of processing was well adapted to military and lend-lease purposes because of the relatively small amount of space needed for shipment. For the military forces the only feasible means of shipping eggs to many distant points was in the dried form. This form provided a nutritious substitute for whole eggs from the shell for most uses. The dried egg did not prove popular with consumers, however, and probably would find its greatest use in the prepared mixtures of flour and other foods for home and institutional use. The advent of the dried egg made the public less dependent upon storage shell eggs in the low egg-producing season. Egg production had also become more constant throughout 12 months of the year.

The value of the poultry industry more than doubled during the decade. The gross income from chickens in 1937 was estimated at \$353,971,000 and in 1943, the high year, \$797,470,000. During this period the turkey industry made rapid growth, adding materially to the poultry total. The turkey income rose from \$66,933,000 in 1937 to \$204-

396,000 in 1944. Prices of chickens and eggs were fairly stable on the average from 1930 to 1940. Chickens ranged from a farm price of 10 to 16 cents per lb. In 1941, the upturn in prices came, and the average paid farmers in 1945 rose to nearly 26 cents per lb. Eggs rose at the same time from 21.3 cents per dozen in 1937 to 37.5 cents in 1945.

Extensive price support programs were used for eggs, but the principal federal government action affecting poultry was the series of restrictions placed upon the use of grains in 1945 and 1946 to divert the latter to relief needs. Chicken prices were supported at 90% of parity by government purchases of dressed chickens. Commercial poultry feed production was reduced about 20% in 1946 below 1945 with more effect on broiler and turkey production than on egg output. Prices of grains and concentrated feeds were raised in early 1946.

Turkeys.—The U.S. turkey-raising industry began to expand in the early 1930s but made its greatest growth from 1941 to 1946. Total production ranged from 303,000,000 to 406,000,000 lb. before 1937, when it was 375,787,000 lb. After the outbreak of World War II, the output moved up to 508,788,000 lb. in 1940 and then to 601,690,000 lb. in 1944. Turkey raising had become a highly specialized business, most of the birds being raised on farms in large flocks of 5,000 to 10,000 birds each. The farm price of turkeys rose from about 17 cents per lb. in 1937 to 33.9 cents in 1944. Gross income during the same period increased from \$66,933,000 in 1937 to \$204,396,000 in 1944. Civilian consumption of turkeys increased from an average of 2.6 lb. per capita in 1935-39 to 4.4 lb. in 1945. Large numbers were taken by the U.S. military services in the war years, but a large cold-storage stock accumulated in 1945. The tight feed situation was expected to reduce the 1946 output. A price support program was operated in 1946 to keep prices at 90% of parity. (See AGRICULTURAL RESEARCH ADMINISTRATION; EGGS; MEAT.) (J. C. Ms.)

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Pound, Sir (Alfred) Dudley (Pickman Rogers)

Sir Dudley Pound (1877-1943), British first sea lord, was born Aug. 29, 1877, and was educated at Fonthill, East Grinstead, and at The Limes, Greenwich. He was in command of H.M.S. "Colossus" at the battle of Jutland May 31, 1916, and was mentioned in dispatches for his part in the engagement. From 1922 to 1925 he was director of the admiralty's plans division, and from 1925 to 1927 chief of staff to Admiral Sir Roger Keyes, then commander in chief of the Mediterranean fleet. He was assistant chief of the naval staff (1927-29) and served two years as rear admiral in command of a battle cruiser squadron (1929-31); in 1932 he was appointed second sea lord and chief of naval personnel at the admiralty. He was advanced to admiral in 1935 and the next year he was named commander in chief of the Mediterranean fleet. On May 17, 1939, he was appointed first sea lord and chief of the British naval staff to succeed Admiral Sir Roger Backhouse. During World War II, he attended the principal conferences between Prime Minister Churchill and President Roosevelt and participated in the United Nations staff talks. Shortly after his return from the first Quebec conference in the summer of 1943, he took ill and on Oct. 4 resigned his naval post. He died in London, Oct. 21, 1943.

Powder Metallurgy

See METALLURGY.

Power, Electric

See ELECTRICAL INDUSTRIES; PUBLIC UTILITIES; RURAL ELECTRIFICATION; TENNESSEE VALLEY AUTHORITY.

Pownall, Sir Henry Royds

Sir Henry Pownall (1887-), British army officer, was born Nov. 19, 1887, in Blackheath, England. Educated at Rugby and the Woolwich Royal Military academy, he won the distinguished service order and the military cross for his service during World War I as an artillery officer. He became chief of the general staff of the British expeditionary force in 1940. Later, as inspector general of the home guard, he swiftly reorganized British home units in preparation for possible German invasion. Named temporary lieutenant general in 1940, he was vice-chief of the imperial general staff, May 1941. On Dec. 27 of that year, he was designated commander of British forces in the far east, with the task of checking the Japanese invasion of Malaya and of co-ordinating British military activity in the Pacific with that of its allies.

In Jan. 1942, he was made chief of staff to Gen. Archibald Wavell, then supreme commander of the Pacific area, and two months later was given command of British imperial forces in Ceylon. In March 1943, he was shifted to the middle east as commander of British forces in Iran and Iraq and in the following Oct. he was returned to the southeast Asia theatre as chief of staff to Adm. Lord Louis Mountbatten. Sir Henry's resignation from the latter post because of ill health was announced Nov. 27, 1944.

Pragmatism

See PHILOSOPHY.

Prague

On March 15, 1939, Adolf Hitler, preceded by German troops, entered Praha (Prague), capital of Czechoslovakia. The next day he announced that Czechoslovakia had ceased to exist and appointed Konstantin von Neurath as protector of Bohemia-Moravia. After President Emil Hácha had been forced to sign documents ending the country's independence, the protector closed the university and ordered all students and school children in Prague to turn out to watch a parade in his honour. Few attended as directed, and many turned their backs. In Sept. 1941, Reinhard Heydrich succeeded Neurath as protector, and a reign of terror began in the city, with mass killings. On June 4, 1942, Heydrich died from bullets fired by assassins near Prague, after which many Czech hostages were killed in retaliation by the Germans, and the village of Lidice was razed. In 1945, shortly after Hitler's disappearance, Grand Admiral Karl Doenitz, acting head of the reich, declared Prague a "hospital city" as the populace rose to threaten the German rulers while Allied planes, supporting the partisans, bombed the city. Even after fighting had ceased on all fronts, Prague continued to be held by the Germans. There Field Marshal Ferdinand von Schoerner declared he would not recognize the armistice. In the ensuing battles for control of Prague, German artillery pounded the city and suburbs as two Russian armies converged on the capital. On May 9, 1945, Russian troops entered the city, and firing ceased shortly thereafter. Practically no damage had been done in the city except for the town hall and two other historical buildings on the Old Town Square (Staroměstské náměstí). (See also CZECHOSLOVAKIA.)

620 Precious Stones

*See GEMS AND PRECIOUS STONES.***Pregnancy***See GYNAECOLOGY AND OBSTETRICS.***Presbyterian Church**

The Reformed Churches holding the Presbyterian system, within the United States of America, numbering 12, made some notable progress in various fields of Christian endeavour during the decade 1937-46. A positive advance was made in the union of a number of the denominations within the Presbyterian family.

Although progress in the movements toward unity had been made before 1937, two meetings that gave an impetus to a closer relationship among the Reformed Churches and influenced some of the general trends toward union in the United States were the Oxford conference and the Edinburgh conference which met during 1937. The Oxford conference on "Church, Community and State" was attended by about 800 delegates belonging to all Christian churches except that of Rome. The Edinburgh conference on "Faith and Order" had 414 delegates from 122 Christian communions in 43 countries. In its final report on "The Church's Unity in Life and Worship," the conference set forth three different levels of unity as (1) co-operative action, (2) intercommunion, (3) corporate union. To obtain corporate union it was recognized that unity in faith was essential for organic union. The supreme standard of the faith was "the revelation of God contained in the Holy Scriptures and summed up in Jesus Christ." A movement for a "World Council of Churches" to unite the interests of both of these conferences in a single representative body was instituted. In 1938, the Presbyterian and Reformed Churches officially approved the organization of the World Council of Churches as proposed in the provisional conference held in Utrecht, the Netherlands.

In the United States in 1934, a movement in the direction of organic union between the Reformed Church in the United States and the Evangelical Synod of North America had been initiated. The first meeting of the general synod of "The Evangelical and Reformed Church," the name adopted for the united church, was held in June 1934. In 1938, the organic union was consummated, and in 1940 the new constitution was put into operation. The new church consisted of 34 synods, 2,478 ministers, 2,873 congregations with a total communicant membership of more than 650,000 and a Sunday school enrolment of almost 600,000.

During the decade 1937-46, the two branches of the Presbyterian Church which arose out of the conflict between the states in 1861-65 made definite progress in the direction of reunion. In 1941, the general assembly of the Presbyterian Church in the United States of America (Northern) directed its three boards of foreign missions, national missions and Christian education to appoint committees to confer with similar committees of the Presbyterian Church in the United States (Southern) on means to co-ordinate all the missionary and educational work of the two churches in the hope that "such a procedure would lead to a form of organic union which would be acceptable to both." By the interchange of fraternal delegates and the continued negotiations of the committees on co-operation and union, the two bodies forwarded the movement to such an extent that in 1946 a revised plan of reunion had been prepared for referral to the general

assemblies of both churches.

Both the northern and southern Presbyterian Churches through their committees maintained in the meantime relations with a view to union with the United Presbyterian Church. In 1946, a joint committee of the Reformed Church in America and of the United Presbyterian Church drafted a plan of union to be sent to the judicatories and ministers of both churches for their joint study and suggestions. The Evangelical and Reformed Church, after several years of negotiation with the Congregational Christian Church, adopted a basis of union to be submitted to the synods.

In 1938, the Protestant Episcopal Church presented an invitation to the general assembly of the Presbyterian Church in the United States of America "to achieve organic union between their respective churches." The Episcopal Church through its Commission on Approaches to Unity and the Presbyterian Church through its Department of Church Co-operation and Union prepared articles for a basis of union. The general assembly awaited the action of the convention of the Episcopal Church before acting on the basis of union. The recommendation of the commission to the Episcopal general convention in Sept. 1946 on this proposed basis of union was rejected by the convention, which then voted to continue negotiations toward a closer fellowship.

The western section of the Alliance of Reformed Churches holding the Presbyterian system in the United States and Canada met from year to year and promoted the close relationship between the Presbyterian and Reformed Churches. Delegates from Europe and from the far east were present on various occasions to continue the link with the churches across the seas.

In 1940, all churches of the Presbyterian family joined in the national preaching mission by which a series of evangelistic meetings and conferences over a period of 8 days was held in 22 leading cities of the United States. The central theme in these meetings was "Christ is the Answer" to disturbed world conditions. A deepening sense of oneness in faith was secured by the yearly observance of world-wide communion on the first Sunday in October.

With the entrance of the United States into World War II, the churches of the Presbyterian family, through their official bodies, co-operated with the government to provide for the spiritual life of the men in the service of their country. Through a general commission on army and navy chaplains, of which the churches were members, ministers were selected to serve as chaplains in the armed forces. By Dec. 31, 1943, 996 ordained ministers of the Presbyterian and Reformed Churches in the United States were in the service as chaplains, and in July 1945 the number was slightly more than 1,300. To keep a contact with the chaplains in the field, churchmen were sent on visits through the general commission and other interdenominational agencies, and on invitation of Pres. Franklin D. Roosevelt the church sent the chairman of the general commission, Dr. William Barrow Pugh, a Presbyterian clergyman, to visit the chaplains in the theatres of war operations in Europe, Africa, Asia, South America and later to the Pacific. The congregations put forth special efforts to support by contributions the demands to provide spiritual and material help to the chaplains.

Notable in this endeavour to aid restoration was the campaign launched by the Presbyterian Church (U.S.A.) to raise a restoration fund of \$27,000,000 to aid the Protestants of Europe, to rehabilitate Presbyterian interests and institutions in the far east and to strengthen some phases

of Presbyterian work in the United States that arose as a result of the war. The report of the wartime service commission to the general assembly as of May 1, 1946, showed that the returns had reached \$4,442,177. On Dec. 2, 1946, the report of the Restoration Fund commission revealed that the returns had reached \$18,191,271, or 67.4% of the goal.

Throughout the decade the response of the congregations for funds helped to undergird the work of the churches at home in a number of worthy causes. The Southern Presbyterian Church engaged in raising a \$3,000,000 "Accrued Liability Fund" to put its ministers' annuity fund in operation. The Reformed Church in America and the United Presbyterian Church of North America took steps to provide adequate pensions for their ministers. A \$10,000,000 sesquicentennial fund was raised by the Presbyterian Church (U.S.A.) for the support of the work of that church in its colleges and in certain universities.

In the closing year of the decade, the Reformed Churches holding the Presbyterian system, within the United States, numbered 12 and included 18,351 ministers, 18,569 churches and 4,126,878 communicant members, with approximately 8,000,000 adherents. After the war many missionaries returned to their former fields of labour to aid in the great task of restoration and to further the unity of the Christian Church throughout the world.

Europe.—As in the United States, so in Europe there was an active movement in the direction of union of the Reformed Churches before World War II. In 1933, the national synod of the Reformed Evangelical Church and that of the Reformed Church of France had initiated a movement "officially to undertake the common study of problems relating to the unity of Protestantism, its conditions, and the extent to which it has been realized in the ecclesiastical, doctrinal and disciplinary spheres." After a series of negotiations, a draft declaration of faith was unanimously adopted at a plenary meeting in which the synod of the Union of Free Churches and the Methodist Church of France took part. In 1938, a general assembly of representatives of all four churches approved a common declaration of faith, common liturgies and rules of order. When the synod of the united church met in May 1939, there were 448 parishes with 597 congregations and 513 other preaching points in the church. A minority group of Reformed Evangelical French Churches, representing from 45 to 65 congregations and numbering about 15,000 communicant members did not join in the union. With the outbreak of World War II, the religious life of France was seriously affected by the course of events.

The Reformed Church of France suffered immeasurably from the invasion by the Germans. At the very outset of the war many members of this church were among the 500,000 persons evacuated from the frontiers. With the invasion of France and the resultant displacement of many people, the Reformed Church made every effort to maintain its unity among the three zones into which it had been divided: the occupied, the unoccupied and the prisoners' camps in Germany. That some success in maintaining this unity was realized was apparent from the fact that in Aug. 1941, at the annual meeting of the national synod, all zones were represented. Although the church suffered by the arrest of many of its outstanding leaders, and by the general restrictions upon its freedom, it endeavoured to keep alive a sense of solidarity by occasional meetings.

In May 1943, the national synod sent a formal appeal to the church members for "faithful endurance in a land of measureless suffering." Congregations were without the

services of ministers in some areas because of forced labour, internment and imprisonment of the clergy and theological students. In 1944, the national synod reported that 595 pastoral posts were being served by 393 pastors. In June 1945, the national synod addressed a vigorous message to pastors and members to a life of "work and faith" in the performance of "heroic and outstanding duties" amid indifferent standards of social life and immorality in France. For the restoration of church life in France, the national synod in May 1946 emphasized the nature and responsibilities of the pastoral ministry.

In other sections of Europe, war, conquest and mass evacuation laid tremendous burdens on the Reformed Churches of Europe. The progress that had been made before the war in movements toward unity helped to maintain faith, vitality and hope. Churches contributed money for the care of their own members and to the work of churches in other lands. In general the churches were crippled by loss of personnel to the army and navy, destruction of churches, hospitals and other property and by the presence of many refugees from other parts of their own land or from other countries. The partition of some areas broke up church organizations. In central Europe, the Vienna arbitration divided the Transylvania Reformed Church in two—two-thirds of the parishes went to Hungary, and the rest, comprising 251 parishes with about 238,000 persons, remained in Rumania.

The miseries of the war produced a certain lethargy which affected both ministers and congregations. To overcome this state, emphasis was placed upon evangelization for the whole church. Although some congregations were reported as being larger than before the war, the outlook for training ministers was depressing because of the lack of funds for maintaining theological institutions and the poverty of the students. Capital and the value of contributions decreased markedly as a result of inflation, and land was lost under agrarian reforms. Such general chaotic conditions prompted the synodical council of the Hungarian Reformed Church at its first meeting in May 1946 to acknowledge its failures and to confess its faith in an exemplary Christian life. It condemned the measures against the Jews, and expressed the conviction that true reconstruction was possible only on the basis of humanity and in the spirit of the Gospel. A free council of Protestants was formed in 1946 to voice the church's position in matters of national significance and church co-operation.

In Czechoslovakia the Protestant and Free Churches had grievous restrictions placed upon them when overrun by the invading forces. Censorships were placed upon sermons. Hymns that were prayers for the fatherland and for God's protection, in the hymn book of the Czechoslovak Church, were forbidden. The central authorities of all the churches received directions and orders either directly from the reich protector's office or through the intermediary of the Czech ministry of education. In 1946, reports from Czechoslovakia indicated that religious freedom there was greater than for many years. Religious instruction was given in the public schools, the Theological Faculty was reopened after six years and reconstruction was being carried out under moral and spiritual influences.

In Italy, the Waldensian Church carried on its services in the face of dictatorship and war. The occupation of Italy by the Germans added to the hardships of this church. Since the war relations between the church and state had not been clearly defined and materials for rebuilding were

granted only to churches of the state religion, restoration was delayed. At a meeting of the synod of the Waldensian Church in Sept. 1946, a group was commissioned to launch a campaign for evangelism that was facilitated by the grant to broadcast religious services from stations in some of the chief cities.

In many of the smaller countries where the Reformed Church continued to exist, the experiences of the congregations were as harrowing and cruel as those in the larger countries. Congregations were scattered, church buildings destroyed and many members imprisoned and persecuted. In the Netherlands during the German occupation, young members of the underground suffered death by torture in Germany, and many ministers were imprisoned and some shot. In Poland, Lithuania and the Ukraine, the existence of the Reformed Churches as organized bodies practically ended during the war. But reports indicated that the work did not cease. In the Ukraine, it was reported in 1944 that 4 Reformed preachers served 30 congregations. After the war, the Protestant Churches in Poland created an official council of Protestant Churches recognized by the Polish government as the official organ of the Protestant Churches. The outlook for the Reformed Church in Greece, which suffered severely during the war, was brighter. In Sept. 1946 the general assembly of the Greek Evangelical Church met for the first time after 1939. In resolutions it emphasized the need of evangelization and the importance of having the scriptures available in the vernacular for the spiritual growth of the people. (W. B. Pu.)

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Pre-School Children, Education of

See EDUCATION.

Presidents, Sovereigns and Rulers

For the names of all heads of state during the decade 1937–46, see articles on the individual nations concerned.

Preysing, Conrad von

Cardinal von Preysing (1880–), German prelate, was born at the Castle Kronwinkel, in the archdiocese of Munich on Aug. 30, 1880, of royal parentage. He attended Munich and Wuerzburg universities but abandoned a diplomatic career in 1908 for the priesthood. Educated by Jesuits at Innsbruck, Austria, he was ordained in 1912 and was elevated to the bishopric in 1932. Three years later he was transferred from the see of Eichstaett to the see of Berlin.

An outspoken foe of nazism, Preysing denounced nazi treatment of the Catholic Church in a pastoral letter read from the pulpits of all Berlin's Catholic churches on Dec. 5, 1937. He risked possible imprisonment in Dec. 1942 with issuance of a Christmas letter, addressed to Catholics in Berlin, denouncing nazi oppression of racial minorities, execution of hostages and enslaved peoples and application of the doctrine of mercy deaths. He urged the Germans to disavow their nazism and change "their mode of thinking."

He was proclaimed cardinal by Pope Pius XII Feb. 18, 1946.

Price, Byron

Price (1891–), U.S. journalist and government official, was born March 25, 1891, in Topeka, Ind. He was graduated from Wabash college, Crawfordsville, Ind., in 1912 with a B.A. degree and went into newspaper work. Joining the Associated Press in 1912, he was later transferred to the Washington bureau. He enlisted in the army after the U.S. entry into World War I and returned to the Associated Press after the Armistice. He was news editor of the agency's Washington bureau (1922–27) and was appointed executive editor of the entire organization in 1937.

On Dec. 16, 1941, he was appointed director of the Office of Censorship. Although Price co-operated with other government agencies and departmental heads in fulfillment of his duties, he was given a great deal of latitude in deciding what was or was not censorable.

After the defeat of Germany in May 1945 the Office of Censorship relaxed many restrictions on information concerning movement and identity of troops in the European theatre; censorship restrictions concerning troop movements in the Pacific-Asiatic area, however, were retained until the end of the war. After liquidation of the Office of Censorship, Price was named by President Truman, Aug. 30, 1945, as an adviser on public relations in the U.S. occupation zone in Germany. After leaving government service, Price was appointed, on Dec. 5, 1945, vice-president of the Motion Picture Producers and Distributors of America.

Price Administration, Office of

The Office of Price Administration, a U.S. government agency, was empowered by act of congress in Jan. 1942 to stabilize prices of goods and services, as well as residential rentals. OPA was also empowered by presidential directive to ration goods made scarce by U.S. participation in World War II.

The U.S. rearmament program launched in May 1940 and the commitments arising out of the Lend-Lease act of March 1941 brought acute pressures to bear upon the nation's price structure. Rapid expansion of governmental military outlays increased national income at an unprecedented rate and at the same time levelled off the volume of goods available for civilian use. The resulting gap between enhanced consumer purchasing power and lowered civilian supplies resulted in a situation which, if unchecked, could have worked severe hardship on the population and seriously impeded the defense program.

The Advisory commission to the Council of National Defense, appointed in May 1940 to direct the nation's armament program, undertook the functions of price stabilization and consumer protection. Under presidential executive order these functions were taken over in April 1941 by the Office of Price Administration and Civilian Supply. Through a system of selective controls, OPACS had endeavored to stabilize about one-half the price structure prior to the retail level. Having no legislative authority and therefore no power to enforce formal orders, OPACS had to rely chiefly on informal controls. Four such types of control were used: suggestions to the industry; fair price requests, which made public a list of prices deemed to be fair and requesting industry adherence; "freeze" letters, directed to members of an entire industry whose prices were out of line, calling upon them to hold their prices to the level of a specified date; and voluntary agreements, by which an industry volunteered not to exceed the price level of a specified date, or not to raise its prices without prior notification to OPACS. In

addition, formal price schedules had been issued on a number of basic industrial materials.

“General Max.”—Existing price schedules, covering a number of commodities at producing and wholesale levels, were at once reissued as “regulations” within the meaning of the law, and a general order (General Maximum Price regulation) was promulgated covering retailers as well as producers and wholesalers, by freezing prices at March 1942 levels for virtually everything the U.S. family wore or used, and for about 60% of all foods.

cost of living and consequent cutting into the purchasing power of wage income was making it impossible to stem inflationary wage increases. An accelerated rise in wages and in farm prices would have breached the controls over industrial prices. To remedy this situation, President Roosevelt called upon congress to amend the price control act, and in Oct. 1942 the Stabilization act of 1942 was passed, giving OPA power to extend control over food prices, and simultaneously providing a statutory basis for stabilization of wages.

OPA was thus enabled to set ceilings on about 90% of retail food prices. To strengthen controls further, pricing of many commodities was transferred from the General Maximum Price regulation to specific maximum price regulations designed to meet the needs of the particular industry or commodity, thus correcting the disruptions in normal flow of goods which had in some cases followed the general freeze of prices. At the same time, OPA began to set specific dollar-and-cent ceilings, replacing the general freeze prices on a number of items. The accumulation of pressures resulting from the increases which had occurred prior to passage of the act was so great, however, that the cost of living continued to rise alarmingly. From Oct. to May 1943, consumer prices as a whole had increased by 5.1%, chiefly because food prices alone had advanced 10.3%. In recognition of this situation, President Roosevelt issued an order directing the price administrator "to take immediate steps to place ceiling prices on all commodities affecting the cost of living . . . to authorize no further increases in ceiling prices except to the minimum extent required by law . . . to prevent further price increases direct or indirect, to prevent profiteering, and to reduce prices which were excessively high, unfair, or inequitable."

Following this "hold-the-line" order, the price administrator announced a four-point program providing for the extension of price control to important commodities, pre-

viously exempt, the extension of specific dollar-and-cent prices for food and setting up of a retail community food price program throughout the country, the reduction of certain food prices which had risen unduly before control could be imposed and more vigorous enforcement. In rolling back some food prices, payment of governmental subsidies to processors was authorized to enable them to continue paying legal farm prices for raw products despite reductions in retail prices. Payment of subsidies for cost-of-living items was chosen as a means of lowering consumer prices because of their effectiveness in preventing unnecessary price increases in war goods purchased by the government, as well as their success in the stabilization programs of Britain and Canada. Under this broad program, food prices were steadily reduced and by Sept. had fallen nearly 4% below the May peak. The cost of living, as indicated by official indices, held fairly steadily until the war's end, consumer prices in Aug. 1945 having advanced only 3% beyond those prevailing in May 1943. Primarily responsible for the rise that did occur were clothing and textile prices, and to a somewhat lesser extent, prices of miscellaneous items, including personal services and theatre admissions which OPA was not authorized to control. Clothing prices from May 1943 to Aug. 1945 had risen 14.5% and house furnishings 16.7%, largely because of the disappearance of low-priced articles from the market as manufacturers channelled production into higher-priced goods.

In an effort to combat the continued increases in prices for clothing and textiles, OPA early in 1945 had issued maximum average price orders for garment manufacturers and woollen and rayon mills which required each producer, by balancing deliveries of higher-priced lines with lower-priced goods, to maintain an average price for his deliveries during each quarter at or below his average price during the specified base period. Adjustments were made from time to time to fit the program to existing supply conditions. A companion program by the Civilian Production Administration channelled production of textiles to manufacturers of certain popular-priced essential garments. For most low-priced cotton apparel, OPA established dollar-and-cent prices and required manufacturers to affix the retail ceiling price to each garment. While these measures did not succeed in rolling back the average of clothing and textile prices, they were on the whole successful in again making some lower-priced garments available for consumers.

Reconversion Pricing.—As early as the summer of 1944, OPA had begun planning for the postwar reconversion period. The problem was threefold: first to establish prices for consumer goods which had been entirely or largely off the market because of wartime restrictions; second, to provide adjustments in ceiling prices for manufacturers of other goods who were finding it difficult to continue production at existing price levels; and third, to provide for orderly decontrol of commodities as soon as it appeared probable that balanced supply and demand would keep prices from rising unduly.

The arrival of V-J day found the agency ready to launch its program for the critical transition period, determined that the pricing process would not hamper expansion of production for peacetime use. The OPA record to that time was impressive. Production during the war broke all records and in both industry and agriculture expanded approximately five times as much as during World War I. Price increases were far less than during the

first war, and after the spring of 1943 a high degree of stabilization was attained.

Measuring in each case from the last month of peace, the official indices showed consumer prices up only 31% by V-J day, exactly one-half the 62% rise that took place by the Armistice in 1918. Wholesale prices had increased only 41%, as compared with a rise of 102% by the Armistice. From May 1943 to Aug. 1945 the rise in consumer prices had been held to 3% and that of wholesale prices to less than 2%.

The special pricing formula finally worked out for reconversion goods adjusted maximum prices for reconverting industries to reflect cost during the last period of normal production, adjusted for subsequent lawful changes in materials prices and in basic wage rate schedules of factory workers, plus the industry's peacetime profit margin over costs. This formula did not attempt to take into account all the factors which had affected production costs since 1941. It ignored some factors which temporarily increased costs, such as dislocation of supply, less efficient labour and payment of overtime rates and shift differentials; but it similarly ignored factors which had decreased costs, such as the ease of selling and the effect of technological progress achieved in many industries during the war period.

This reconversion formula was also applied to some industries which had continued to sell on the civilian market throughout the war at prewar prices, offsetting losses incurred on these products by highly profitable military sales to the government. The levelling off of sales to the military after V-J day, however, made price adjustment necessary on civilian sales.

Pending issuance of industry-wide price increases for reconverting industries after review of price ceilings, an adjustment mechanism was set up for individual reconverting producers who needed immediate adjustments. This adjustment procedure was also used for cases in which the industry-wide price increase was inadequate for an individual producer, and for cases in which there had been no request for industry-wide review of price ceilings. Virtually automatic pricing was thus provided for about two-thirds of all reconverting firms. Authority was delegated to OPA field offices to act upon more than 90% of such applications for adjustments.

The first of the industry-wide reconversion increases was issued just a month after the Japanese capitulation, and by the following spring initial increase factors had been issued for virtually all of the reconversion industries. A good many of these factors had to be revised, however, in view of subsequent changes in price policy which are discussed below.

Another price adjustment policy adopted after the cessation of hostilities was to permit price increases wherever existing ceilings would prevent expansion of production for peacetime needs. In addition, a general adjustment program was established to keep individual manufacturers from remaining in a loss position.

In the months immediately following V-J day, OPA endeavoured to prevent consumer prices from rising by requiring wholesale and retail sellers to absorb a substantial part of the increases granted manufacturers. Under OPA standards, however, no trade was required to absorb cost increases if its earnings would thereby be reduced below base-period levels. Where the base-period earnings standard was not impaired, a distributor could be required to absorb a manufacturer increase to the point where his ceiling price covered his total cost of handling the product. In the case of reconversion products

which in normal times constituted the bulk of the distributive trade's normal business (such as automobiles or electrical appliances), however, the distributive trade was permitted to maintain its average peacetime realized margin on the product or group of products.

Because of the relatively moderate producer increases which implemented reconversion pricing policy and because of the "absorption" of manufacturer price increases required at intermediate distributor levels, consumer prices held at Aug. levels in the six months following. A change in the government's wage-price policy, announced in Feb. 1946, however, caused a dent in the cost-of-living line, which had held firmly since May 1943. Under the new policy, the basis upon which wage increases could be granted was greatly broadened, and OPA was directed to permit ceiling prices to reflect higher labour and materials costs for those industries which otherwise would not earn their base-period return in the ensuing 12 months. During the war, OPA had frequently acted to adjust price ceilings in order to maintain generally fair and equitable prices, according to the intent of congress, or to offer incentive for the production of scarce items needed in the war economy.

Adjustments had also been made when found "necessary to a swift and orderly transition to a peacetime economy." OPA allowed an average of 65 industry-wide price increases per month in the period between V-J day and the enunciation of the new wage-price policy. In the ensuing 4 months, however, an average of 130 industry-wide increases was allowed each month. At the same time, OPA relaxed somewhat its rules regarding absorption of rises in producer ceilings, and an increasing number of these was passed through to consumers. The effect of the new policy was immediately seen in the official indices. Wholesale prices in June 1946 were almost 5% over those of the preceding Feb. and consumer prices rose almost 3%. These increases were small, however, compared to those that occurred during the remaining months of 1946.

Amendments by Congress.—From the beginning of its

statutory life OPA had been reviewed by congress each year after extensive hearings as to the need for and the efficacy of the act. After the initial passage of the Emergency Price Control act and the Stabilization act in 1942, the annual extension or appropriation acts for the most part curbed some specific phases rather than broadened the legal powers of the agency. Thus, in 1943, congress severely limited use of grade labelling or standards in establishment of ceiling prices. It also stipulated that any person who directed the formulation of any price policy, maximum price or price ceiling had to be qualified by experience in business, industry or commerce; this was the so-called "anti-college-professor amendment."

In the Stabilization Extension act of 1944, congress required that prices for each of the major products made from cotton or yarn, including at least 80% of all cotton textiles by volume, should separately reflect the parity price to growers, whether or not such a price was actually paid. (Parity prices were determined and published by the secretary of agriculture and reflected a price which, if paid to farmers, would currently give the commodity a purchasing power, with respect to the articles farmers buy, equivalent to the purchasing power of the commodity during a base period—in most cases 1909-14.) Other amendments passed at this time which led to higher prices directed OPA to make adjustments in ceilings for fresh fruits and vegetables whenever weather or some unforeseen disaster substantially reduced the crop yield, and to keep prices for any fishery commodity at levels not below the 1942 average for the commodity.

In 1945, with the war in Europe already over and the capitulation of the Japanese in sight, congress further liberalized price control, providing that prices on meat products should permit the meat-packing industry as a whole to earn a profit on the processing of each species of meat, and that cattle and calves, lambs and sheep, and hogs were to be separately considered.

The elimination of virtually all wartime controls except those over price, shortly after V-J day, led to a great deal of pressure upon the government to remove these controls also. However, the huge reservoir of unsatisfied consumer demand and the accumulation of liquid savings together with the abnormal volume of currency in circulation and the continued large government expenditures did not permit rapid and indiscriminate removal of price controls. Under the law OPA was to expire June 30, 1946, and congress was confronted with the problem of weighing the inflationary situation to determine the need for again extending price control. Congressional committees began hearings on extension early in Feb. and touched off a powerful drive on the part of nearly all industrial business and farm organizations to abolish OPA or severely limit its powers.

After months of acrimonious debate in committee and in congress itself, a much weakened price control extension bill was presented to the president for signature just a few days before the law was to expire. This bill President Truman vetoed on June 29, 1946, as a "choice between inflation with a statute and inflation without one," declaring his most fundamental objection being to the numerous amendments which would raise the price of essential cost-of-living commodities.

Decontrol.—All price controls therefore lapsed at midnight on June 30, 1946, and a free market prevailed until July 25, when a new extension act became valid. In continuing OPA until June 30, 1947, congress seriously modi-

"Waiter Trouble." A *Chicago Tribune* cartoon by Parrish, on the nature and causes of U.S. food shortages during World War II



fied its authority and shifted the emphasis of the law from general control of prices to decontrol. Specific restrictions were placed on the methods used by the agency in fixing maximum prices assuring a higher price level for some commodities, control of agricultural prices was transferred to the secretary of agriculture and an independent Price Decontrol board was created. Payment of government subsidies to producers, moreover, was greatly circumscribed, extension of payments to new commodities and increases over previous rates being prohibited (sugar exempted), as well as all payments on commodities freed from price control, except for petroleum from stripper wells. Termination of most subsidy payments by April 1, 1947, was directed.

Price ceilings in effect June 30, 1946, were immediately restored on all goods and services not explicitly decontrolled in the act. Residential rents, consumer and industrial goods and about 40% of food products were thus recontrolled. Uncontrolled pricing was continued until Aug. 21, 1946, for poultry, eggs, tobacco, grains, livestock, milk, cottonseed, soybeans and petroleum. Feeds made from grains and food or feed products made in whole or substantial part from these listed commodities also remained free of control. Final responsibility for recontrol of these commodities was placed upon the Price Decontrol board. Cotton was permanently exempted from control. The Price Decontrol board on Aug. 20 unanimously decided upon the recontrol of livestock and meat, edible fats and oils, soybeans, flaxseed, mixed feeds and by-product feeds. The other listed commodities were continued on the free market.

Criteria for bringing any product back under control were: (1) that the price had risen unreasonably above the maximum price on June 30, 1946, plus subsidies payable as of June 29; (2) that the commodity was in short supply; (3) that regulation was practicable and enforceable; (4) that the public interest was served by restoring ceilings.

The law also provided for decontrol of all items "not important in relation to business or living costs." This policy had already been pursued by OPA since V-J day, but the act stipulated decontrol of all such nonessentials by Dec. 31, 1946. In addition, decontrol was ordered whenever supply of a nonagricultural commodity equalled or exceeded demand, a policy also previously followed by the agency. Explicit provision was made, however, for industries to petition OPA for removal of ceilings from nonagricultural commodities and the secretary of agriculture for removal of ceilings from agricultural commodities, with final authority for review resting with the Price Decontrol board.

The immediate effect of the new price control law was a flood of OPA orders removing minor items from price control and raising prices for products still under control. In the first month following the effecting date of the new act, more than 300 industry-wide price increases were allowed, at least half of which were specifically required under the new act. A good many of the other increases, while not required under the law, originated to a large extent in the new law since price rises were allowed on secondary products, passing on required increases on component materials in order to maintain production of needed commodities. Virtually all of these increases were passed through to the consumer since the new act prevented OPA from requiring distributors, where possible, partially to absorb rises in producer prices.

The result of these actions, together with the effect of

releasing thousands of items from control and of the 25 days of free markets, was at once apparent on price levels. In the four weeks following suspension of price controls at the end of June, the wholesale price index rose 10%, the largest advance being in food prices, which rose 24%, while the over-all increase in the consumer price index from mid-June to mid-July was almost 6%, with food alone rising 14%. Both wholesale prices and consumer prices continued to rise, and by the fourth week in Nov. wholesale prices were 23% above levels prevailing before the June 30 temporary suspension of control. The all-over wholesale index was almost 32% above the V-J day level, with food prices up 54%. The total consumer price index in mid-October was 11% higher than in June, 15% higher than in Aug. 1945; and 51% above Aug. 1939; consumer food prices in Oct. 1946 were 24% higher than in June, 28% higher than on V-J day and 93% over Aug. 1939.

On Oct. 15, the president directed the removal of price control on meat and livestock and on food and feed products manufactured therefrom. Congress had temporarily decontrolled these products and the Price Decontrol board had reinstituted control as of Sept. 1, after extensive hearings. In the six-week period that they had been recontrolled, however, the meat supply had dropped off so drastically that the meat shortage became a burning political question for which OPA served as the national whipping boy. The process of releasing commodities from price control was also greatly accelerated in accordance with the president's direction. Within a week, price controls were lifted from all foods except rice and sugar and some sugar syrups. Decontrol of other commodities followed rapidly and on Nov. 9 the president directed "the immediate abandonment of . . . all control over prices except that necessary to implement the rationing and allocation programs of sugar and rice." He reached his decision, he said, because so much of the economy had been freed from price controls that distortions in production and diversion of goods were far outweighing any benefits.

Rent Control.—The reasons impelling the lifting of price controls, however, were not applicable to controls over residential rents, and these continued throughout 1946. Under authority of the Emergency Price Control act, OPA began to regulate residential rents in 1942. In so doing, the country was initially divided into 459 defense rental areas with rents in each area frozen at the level prevailing on a specific date, in most cases March 1, 1942. By the close of 1946, rent control regulations covered more than 20,000,000 nonfarm dwelling units (houses, apartments, hotels, boarding houses, etc.) in 650 defense rental areas where more than three-fourths of the U.S. population resided. Upward pressure on residential rental ceilings became even sharper after V-J day, permitting decontrol in relatively few areas where war activities, such as military training camps, had ceased, and necessitating extension of control to many new areas where return of ex-service men and defense workers and their families to their former homes or to schools and universities sharply increased the housing shortage. During the debate on the price control act extension in 1946, congress twice rejected moves for a general increase in rental ceilings. The rent control program was one of the most successful undertaken by OPA, having been highly effective in holding residential rentals virtually stable throughout the war and keeping the total rise from Aug. 1939 to Sept. 1946 to a little more than 4%.

Rationing.—Rationing of sugar continued throughout 1946, the sole commodity under rationing control since the close of 1945. Throughout the war years OPA was

authorized by presidential order to ration items made scarce by the war. The delegation of this authority to OPA was first made experimentally on Dec. 27, 1941, when hostilities in the Pacific choked off rubber imports from the far east, and it became clear that automobile tires would have to be equitably distributed to essential users. Tires, automobiles and typewriters were among the first commodities upon which the impact of war was felt. They were rationed by certificate, as were bicycles. But by the end of 1942, the use of coupon books in rationing was well established. The first war ration book, put in use in 1942, provided coupons for sugar, then also for coffee. A separate coupon book was issued for gasoline, and coupon sheets were issued for fuel oil. Point rationing was started early in 1943 for meats, fats, and oils, butter and cheese and processed foods. Also brought under nation-wide rationing in 1943 were coal and oil heating and cooking stoves and shoes. At its peak, OPA administered 13 rationing programs.

Reduced military demand, releasing large stores of supplies to the civilian population, made it possible for OPA to end its rationing programs for all but sugar and rubber tires before the close of Nov. 1945. Rationing of processed foods, gasoline, fuel oil and stoves was terminated immediately after the Japanese surrender, and rubber footwear, canned milk, cheese, automobiles, shoes, and meats, fats and oils in the following two months. Rationing of rubber tires was ended at midnight Dec. 31, 1945.

Administration and Administrators.—Price controls and rationing were administered through a national office in Washington, D.C., responsible for the development of regulations and policies, but a major part of the activities were carried on in the field through 9 regional offices, 93 district offices and 5,661 local war price and rationing boards at the peak of activities, when 63,426 paid workers were employed, supplemented by services of as many as 235,000 volunteers at local board levels. The number of boards was reduced drastically following the ending of all rationing programs but sugar, and the remaining 1,642 boards, which had been chiefly responsible for supervision of prices in retail stores, were finally closed on Nov. 4, 1946. Likewise, the number of paid employees, which had dropped to 35,000 by the autumn of 1946, was down to 16,000 by the close of the year.

Leon Henderson was appointed to the National Defense Advisory commission in May 1940 as commissioner in charge of the Price Stabilization division. He was named administrator of OPACs (subsequently OPA) in April 1941. Prentiss M. Brown succeeded him in Jan. 1943. Chester Bowles, who had been appointed general manager of OPA in July 1943, became administrator in Oct. 1943. Bowles served until Feb. 1946, when he became director of stabilization. He was succeeded by Paul A. Porter, who remained as administrator until Dec. 1946, when Max McCullough became acting administrator during the interim when a merger of government war agencies was being completed.

On Dec. 12, 1946, the president issued an executive order creating the Office of Temporary Controls under which the continuing responsibilities of OPA were consolidated with certain other government war agencies. Major General Philip B. Fleming, Federal Works administrator, was named by the president to head the new agency. (See also

AGRICULTURE; PRICES; RATIONING; WAR PRODUCTION.)

(P. A. P.)

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Prices

In April 1937, U.S. wholesale prices reached 88.0 (as measured by the United States department of labour, bureau of labour statistics, using the average of 1926 as equal to 100) after averaging 64.8 for the depression year of 1932. During this upward climb of prices, the Roosevelt administration had sponsored minimum prices, minimum wages, the National Recovery administration's industrial codes frequently forbidding sale below cost in an effort to stifle competition, the destruction and restriction of farm production in an effort to raise prices, and "pump priming" (a term applied to the government's policy of deficit spending in an effort to raise the level of business activity). By 1937, the United States was enjoying a level of business activity considerably higher than that of the early '30s. However, the part played by the federal government in bringing about this rise in prices was uncertain and was still being debated ten years later. The wholesale price movement turned down after March 1937 and was followed by a downturn in business activity in the late summer. Although business activity dropped rapidly through the spring of 1938 and then recovered, wholesale prices declined gradually and continued to decline through Aug. 1939, at which time the combined index rested at 75.0.

The price decline during this period was not uniform for all classes of products. The overall index declined 15%, but raw materials prices declined 25% while finished goods declined less than 10%; farm products dropped 34%, food products 21%, and "all others" only 7%.

When the war in Europe broke out in Sept. 1939, there was a temporary flare-up of inflationary trends. In many commodities the immediate price rise amounted to 30% or 40%, principally in raw materials and commodities which had experienced large price rises in World War I. Farm and food prices recovered a substantial part of the position they had lost during the decline from 1937. The rise in the combined index from 75.0 in August to 79.4 in October was much less sharp than that in many individual prices, because of the inclusion of a number of different articles and many manufactured goods normally more stable in price. During these months retail prices and the cost of living increased, but, customarily, the movement was not as great as in wholesale prices and lagged slightly.

The rise was only temporary, and by Feb. 1940 wholesale prices had started down again. The decline was in part because of a slackening of forward buying in the dis-

Table I.—Wholesale Price Index in United States
1937-1946
(1926 = 100)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1937	85.9	86.3	87.8	88.0	87.4	87.2	87.9	87.5	87.4	85.4	83.3	81.7
1938	80.9	79.8	79.7	78.7	78.1	78.3	78.8	78.1	78.3	77.6	77.5	77.0
1939	76.9	76.9	76.7	76.2	76.2	75.6	75.4	75.0	79.1	79.4	79.2	79.2
1940	79.4	78.7	78.4	78.6	78.4	77.5	77.7	77.4	78.0	78.7	79.6	80.0
1941	80.8	80.6	81.5	83.2	84.9	87.1	88.8	90.3	91.8	92.4	92.5	93.6
1942	96.0	96.7	97.6	98.7	98.8	98.6	98.7	99.2	99.6	100.0	100.3	101.0
1943	101.9	102.5	103.4	103.7	104.1	103.8	103.2	103.1	103.1	103.0	102.9	103.2
1944	103.3	103.6	103.8	103.9	104.0	104.3	104.1	103.9	104.0	104.1	104.4	104.7
1945	104.9	105.2	105.3	105.7	106.0	106.1	105.9	105.7	105.2	105.9	106.8	107.1
1946	107.1	107.7	108.9	110.2	111.0	112.9	124.3	129.1	124.0	134.1	139.6	140.9

Source: U.S. Department of Labor, Bureau of Labor Statistics.

rupted commodity markets, to ample supplies of goods aided by a relaxing of import restrictions on sugar, rubber and tin, and to large unused productive capacity. By the end of the summer, wholesale prices started to rise from their low of 77.4. Although the rise which started at this time was considerably dampened by wartime controls, it continued through Dec. 1946, when the combined wholesale price index stood at 140.9.

The rise in the late months of 1940 was attributable mainly to the impact of World War II on the economy of the United States and its attendant effect upon industrial production. Speculation during this price rise at the end of 1940 was much less pronounced than it was a year earlier at the beginning of the war. Except in isolated instances there were no speculative rises produced by forward buying. This fact was notable, since the volume of new orders to manufacturers was even greater than a year earlier. The situation prevailed because of a lingering depression psychology, because of a realization that such price rises were unwarranted in view of the unused productive capacity, and because of the government's determination to prevent price maladjustments. The Price Stabilization division of the Defense Commission took direct action against certain excessive price rises. Even the threat of such action in other cases prevented prices from getting out of hand. A system of priorities was also established whereby a manufacturer of war materials would receive the necessary quantity in preference to civilian production without the necessity of bidding up the price to assure himself of adequate materials to fill the contracts.

Spectre of Inflation.—By the end of 1940, the possibility of inflation was generally realized, but it was not generally feared. The labour supply was ample and raw materials were abundant. There was general confidence in the ability of peacetime industry to convert to defense production and in private and governmental efforts to hold back inflation. Governmental action on priorities and in assuring adequate supplies was believed to be very helpful. One example was the lifting of the requirement that all army uniforms be made from wool raised in the United States. Another was the willingness to sell surplus foodstuffs that had been purchased during the 1930s in the programs to raise farm prices. The American Federation of Labor also went on record with a statement that it was unfair to ask for a pay increase if it would raise prices.

In Dec. 1940, the combined wholesale price index stood at 80.0 as contrasted to 79.2 a year earlier. By the end of 1941, it stood at 93.6, 16% higher. During this period the cost of living index, usually a sluggish mover as compared to wholesale prices, increased 10%. The rise in the combined wholesale index was brought about by the magnitude of the defense effort, and by its direct and indirect effects. Enlarged payrolls increased the amount that consumers had to spend. All prices moved ahead under such circumstances, for though the government increased taxes markedly, more than a fifth of its expenditures were financed by bank credit. Much of the private expansion was financed through the same source. In 1940, these factors had not combined to raise prices. In 1941, however, the extent of the activities was greater; many plants were operating at capacity and a shortage of skilled labour was developing. Transportation was proving a bottleneck particularly for imported commodities. Wage rates were advancing and the government's farm support program, a carryover from the days of the New Deal, was increasing the amount of money in the hands of the farmers. With

all of these factors threatening to bring on inflation, the government's demand for war materials continued to grow and intensify each factor. The major factors which restrained the inflationary tendencies at this time were the desire of the people to avoid it and the government's efforts to combat it. Widespread ceilings were imposed, plant capacity was expanded where possible, scarce raw materials were rationed, taxes were increased and sales of defense bonds to individuals were promoted.

By June 1941, the ocean shipping situation was becoming serious. Available tonnage was shrinking because of sinkings and less efficient utilization caused by round-about routing and convoying. Rates for freight and insurance were both advancing, and in many instances there were priorities and preferences as to the allocation of available space. All of this tended to increase the cost of imports and to restrict their amount. The greatest difficulties were experienced in shipments from India and the East Indies. South American rates and shipping had not become as difficult.

The Bankhead-Fulmer act, passed in May 1941, continued the New Deal program with respect to agriculture. This act required the Commodity Credit corporation to offer crop loans to growers of wheat, corn, cotton, rice and tobacco amounting to 85% of "parity." Previously, the loan rate had been 56% on cotton and wheat and 75% on corn and tobacco. These loans were at a substantially higher percentage than those granted under the Agricultural Adjustment acts of the 1930s, and, as other prices had risen, parity had been raised. Because of the terms of these loans they amounted virtually to sale to the government at guaranteed minimum prices. This action, in addition to raising prices on the five commodities specified, also tended to raise the price of livestock, poultry and dairy products. In 1942, these crop loans were raised to 90% of parity and by 1944 the loans on cotton were raised to 95% of parity. In 1944, farm prices were given an additional boost through assuring the farmers the higher of parity or the highest price received between Jan. 1 and Sept. 15, 1942.

A substantial inflationary pressure was placed on prices because the total pay rolls of the country were increased tremendously at the same time that the supply of civilian goods was declining. The workers were being paid on the basis of total production and could buy only a fraction of that production. The difference was the so-called inflationary gap; to close this gap was one of the government's objectives in the attempt to control prices. Attempts were made to close it from both sides—to increase the amount of goods available to consumers and to decrease the amount of money they could spend for goods and services.

Table II.—The U. S. Inflationary Gap, 1942–44
(in billions of dollars)

	1942	1943	1944
Income payments to individuals	\$115.5	\$142	\$152
Available goods and services	78.2	88	89
Gross inflationary gap	37.3	54	63
Absorbed by personal taxes	6.6	16	21
Remainder to be closed by savings, paying higher prices, or paying higher taxes or some combination of these	30.7	38	42

Early in the defense period an attempt was made to increase the volume of available goods through encouraging an increase of production facilities. This device for closing the gap was not successful at the time because of the intense demands of the war effort and did not come into important use until after the end of the war in 1945. The reduction in the amount of excess purchasing power proceeded along several different paths. Increased income and excise taxes were levied, and defense (later war) bond campaigns were widely used. Through educational cam-

paigns, the consumer was shown the wisdom of paying off debts and building up a fund for the purchase of durable goods at the end of the war. Through the federal reserve system the extension of credit to consumers was substantially curtailed, and steps were taken to limit the potential bank credit expansion based on their large excess reserves.

Necessity for Control.—These devices were not completely successful in closing the inflationary gap, and as a result direct price controls were instituted. Controls began in 1941 and became almost complete in 1942. The first price ceiling was placed on used machine tools in March 1941. Aluminum scrap and zinc scrap followed in the same month. By the end of the year there were 54 commodities under stipulated price schedules. These early price controls achieved only limited success, as they were incomplete and based merely on executive order without provisions for enforcement through the courts.

The continued price rise under these stop-gap provisions led to the introduction in congress of the General Price Control act in the last part of 1941. Its major objectives were to avert and restrain the inflationary rise in prices which, if continued, would add to the monetary cost of the war, cause disorder in business and contractual relationships, and raise the general price level with all of its calamitous consequences. The new bill became law in Jan. 1942. It established the Office of Price Administration, gave added power to the price administrator and made his action legally enforceable through civil and criminal court action. He was given power to establish ceilings for any commodity and for housing rents in defense areas. Wages and salaries were wholly exempt from control under this bill, and certain limitations were placed on ceilings for agricultural products in line with the government's program for increasing agricultural production.

Ceilings on farm products were not allowed to fall below the highest of the four following items: (1) 110% of parity (parity being the relationship that existed between 1909 and 1914 between farm prices and the prices of things the farmers buy), (2) Oct. 1, 1941 price, (3) Dec. 15, 1941 price, (4) the 1919-29 average. The National City Bank of New York estimated that under this provision farm prices could increase from 10% on cotton to as much as 40% on corn. In addition to this limitation, no ceiling could be established on agricultural products without the approval of the secretary of agriculture. These provisions could have been enough to nullify the act, for as the farm prices rose to the specified ceiling, factory workers would have asked for a rise in pay to compensate for the rising cost of living. This in turn would have had to be reflected in price rises, which in turn would have raised parity and the farm price ceilings. But this did not happen, for both the price administrator and the secretary of agriculture were aware of the danger and acted to prevent excessive rises in farm prices in spite of any limitations in the act. They planned to sell government stocks of farm products acquired under the surplus buying programs of former years and to call farm loans if necessary. They also planned to set ceilings on hogs and cattle.

Operations under this new price control act continued approximately in the same form as under earlier executive orders with specific ceilings on individual commodities. Prices of staples advanced little during the first quarter of 1942, but finished goods, wage rates and the cost of living continued upward. Further limitations placed on the production of durable goods by the War Production board gave the inflationary tendencies new power.

When Canada adopted blanket ceilings on Dec. 1, 1941, authorities in the United States felt that such action would

be inappropriate for them to follow because of the greater population, the greater complexities of distribution and trade, and the attendant difficulties of enforcement. On the entry of the United States into World War II, however, the increased rise in the cost of living and the greater restrictions on the production of consumers goods led to the promulgation of the General Maximum Price regulation in May 1942. This placed ceilings on prices of most goods and on many services. The ceiling was the highest price charged in March 1942. This froze a rapidly changing economy to a rigid schedule of prices which were not in adjustment. Many inequalities were bound to arise from such a sweeping regulation, the only alternative to which would have been an astronomical number of price determinations. Retail prices normally lag behind wholesale prices during periods of change. At the time of the freeze many retail prices were not sufficiently higher than the replacement price to allow a normal margin for operating overhead. These maladjustments had to be ironed out over the succeeding months, and several devices were used to absorb the burden. In some instances where the line was an unimportant part of the retailer's business, he was forced to absorb the loss. In the majority of cases the prices of the wholesaler and of the manufacturer were "rolled back" to a point which made it possible for near normal margins to prevail at the various stages of distribution. Usually each level of the distribution system was forced to absorb a small part of the roll-back, but the manufacturer was forced to absorb the greatest part. Direct subsidies were not authorized at this time, possibly because they would only increase inflationary pressure by placing more money in circulation while holding prices back. In all adjustments one basic principle was kept in mind: the cost of living was to be held constant if at all possible. But when a roll-back was called for, some one firm or several individual firms had to bear the burden of the squeeze, go out of business or produce a different product. A difficult situation thus arose, in that lower-cost, lower-profit lines of products were dropped in favour of higher-margin items. This forced an unseen rise in the cost of living through enforcing a higher standard of living on the consumers of low-cost lines of products. Attempts to correct this situation through forcing production of low-cost lines met with little success.

With the blanket price control in effect, price could no longer be the regulator between demand and supply. Consumers had more money than ever before but little on which to spend it in the legitimate markets. In order to ensure a fair share for all, it was necessary to establish rationing of many commodities in May 1942. Foods, gasoline and fuel oil were the major commodities rationed at the consumer level; shoes, tires and many durable goods were also placed on the ration list. Many illegal operations, carrying on trade above price ceilings or without the use of ration currency, arose. The Office of Price Administration thus found itself with a sizable and difficult enforcement job. The effectiveness of the overall price control program could be measured approximately by the combined wholesale price index, which rose 20% in the year preceding price control and only 6% in the first year under such control.

In the first quarter of 1942, the two major labour unions of the United States began campaigning for wage increases. Their claim was based on the fact that the cost of living had risen, but that wages had not. They asked the president not to place ceilings on wages unless the nation

as a whole was completely controlled with special reference to drastic retail price controls, rationing, and higher taxes on profits. These demands conformed in general with the government's price stabilization program and, as seen above, price controls and rationing came along within a few months and higher corporate taxes followed soon. Nevertheless, in July 1942, these demands led to a general wage increase of 15% in the "little steel companies" to compensate for a 15% rise in the cost of living from Jan. 1, 1941, to May 1, 1942.

Since the total of available goods and services for civilian consumption was no larger, and possibly smaller, than it had been before the war, it was not possible for one group of the total population to have an increased standard of living without reducing that of others. In the labour unions' effort to maintain the same standard of living for their members they overlooked the fact that the total labour force had been increased, that many labourers were holding jobs in higher wage brackets than formerly, that most were now at steady work and that many were working overtime at premium rates. Thus a large proportion of individual labourers were receiving larger annual incomes (without any general rise in wage rates) and labour as a class was receiving a much larger money income than before the war.

The general raise in wage rates increased labour's purchasing power further.

If labour could establish its right to a peacetime standard of living, the price spiral would continue upward. Wage and salary stabilization was therefore adopted in Oct. 1942. Under these regulations, general wage increases could not be granted beyond the 15% established by the Little Steel formula. Individual increases were allowed for merit, to raise substandard wages, and if given in accord with an established pay raise scheme. Penalties on employers for violation were severe, extending as far as the disallowance for tax purposes not only of the illegal wage increment, but of the total paid to any worker receiving an illegal increment.

Gradual Rise.—The year 1942, with all its inflation pressures and controls, showed a rise in the combined wholesale price index from 93.6 in Dec. 1941 to 101.0 in Dec. 1942—a rise of 8% as compared with the rise of 16% in 1941. Farm prices at wholesale rose 20% from an index of 94.7 to 113.8. Food products increased in price almost as much, but all other commodities increased only 2%. The *Survey of Current Business* in Jan. 1943 summarized the 1942 price situation as follows: "In simplest terms it was a case of effective demand outrunning supply at previous lower price levels, forcing prices to move progressively higher throughout the year. The prime factors on the demand side were the record-breaking volume of government and industrial buying and the resultant heavy flow of purchasing power into consumers' hands. . . . The prime factor on the supply side was the growing relative scarcity of goods and services available to consumers. . . . Had consumers been free to dip into their record-breaking savings and bid prices up, and had sellers been free to hold goods for sale to the highest bidders, the cost of living might well have risen more nearly twice as much as it actually did during the year."

In 1943, the price structure held very well; the combined wholesale price index increased only 2% from 101 to 103.2, using December figures in each case. Farm products were up 10%, food products only 2%, and other products only 2%. During that year, prices crept up grad-

ually until about May—a climb which prompted President Roosevelt to issue his "hold-the-line" order on April 8. In this order he directed the appropriate authorities to fix price ceilings on all unceilinged commodities affecting the cost of living, to halt all increases in wages and salaries not provided for in the wage stabilization policy of Oct. 1942, and to prevent workers from shifting employment for higher pay. The price indexes held fairly steady throughout the rest of the year.

Toward the end of 1943, the official indexes, particularly the cost of living index, were challenged by numerous organizations as not being representative of the price increases. It was charged that they did not cover black market prices, quality deterioration and the necessity of buying better quality merchandise because low-cost lines had been discontinued. A group of independent statisticians reviewed the index at the request of the government and found that the index was fairly trustworthy with certain reservations. It was really an index of prices of things normally bought by consumers rather than an index of the cost of living and did not cover the increased standard of living forced upon consumers through the lack of low-cost merchandise. The reviewers also reserved their comment to apply only to moderate incomes in large cities. This reservation implied that, because of the limited number of observations used as a basis for the statistical procedure, the price index was not representative of conditions in smaller cities and for those with low or high incomes. Later the name of the index was changed from cost of living to consumers' price index.

One of the major developments in price control during 1943 was the substitution of dollar and cents ceilings on individual commodities instead of the maximums charged in March 1942. This eased the enforcement problem to a considerable degree in that it made the same ceiling on the same article at all stores of the same general type in the same city. Of course, differences had to be made for chain stores as against small independent stores, for large cities as distinguished from small communities, for places distant from the source of supply as compared with those near at hand. Thus the complexity of making price schedules fair to all was increased.

In order to bring adequate supplies into the market at existing ceiling prices, the subsidy payments begun in 1942 were extended during 1943. By October, payments were being made at the rate of over \$1,000,000,000 per annum. Seventy-three per cent of these were for foods and livestock feeds. Metals received 12% of the total, 9% was paid for transportation of petroleum products, and the rest was paid on several miscellaneous items. Several different agencies were responsible for determining policy and handling subsidy payments. They included the War Food administration, Office of Price Administration, Commodity Credit corporation, and Reconstruction Finance corporation—all government agencies. In addition, the War Labor board was in control of wage rate stabilization.

During 1944, the rise in the combined wholesale price index was very slight, only 1½%. Farm products rose 3%, but food products were held almost constant. The inflationary potential of earlier years was present in ever increasing force, but it was restrained both by government regulations and by the desire of most people to avoid a price rise. The main reason for the great stability during the year was the control over food prices; there was actually a slight decline late in the year caused by increasing supplies, improved functioning of price control, and the continuation of subsidies. Subsidies amounted to about \$1,300,000,000 during the year, and three-quarters of the

amount was spent on the butter, meat, wheat and dairy products sections of the industry.

In contrast to food prices, prices of household furnishings and clothing increased during 1943. The increase was more than was apparent in the published indexes because of the increased scarcity of low-cost items. Men's work clothes and children's wear were the most hard hit by this shortage. Attempts were made to correct the difficulty by allocating certain raw materials for the manufacture of these low-cost items only. The program was not comprehensive enough to be of much benefit.

During 1944, the productive machinery of the country was adequate to supply civilians with a comfortable standard of living (not allowing for depreciation and depletion of durable goods such as automobiles and washing machines) and to provide the materials of war. This made it possible for the price control and rationing programs to be effective. Nevertheless, the inflationary gap still existed, because money was being paid out to civilians for production of war materials, which were not available for their use. The total civilian income was greater than the value—at a stable price level—of the available goods and services. As a result (1) of the adequacy of civilian goods to meet needs (but not desires) and (2) of the effectiveness of price control, all of the consumer income was not spent; a substantial portion was saved.

Price controls continued, and the number of items transferred from the general maximum price regulation to dollars and cents ceilings increased, thus making easier the task of enforcement. Rationing also continued to relieve pressure on prices and to distribute scarce supplies more equitably than would have been possible otherwise. Easing of supplies made it possible to remove rationing controls from some meats and from canned vegetables for part of the year, but it was later necessary to restore them.

Victory in Europe and Asia in 1945 did not bring an end

Skeptical consumers feared "Cutting Loose" from price restrictions in 1946, despite the theory advanced that open competition was an adequate safety valve against inflation. Shoemaker's cartoon appeared in the *Chicago Daily News*



to the inflationary pressures on prices. Several years earlier it had appeared that at the end of the war all productive facilities would be turned to the production of civilian goods and that with a matching of pay rolls and available consumers' goods, the inflationary gap would be closed and the upward pressure would drop. This was not the case. With final victory there were many large cancellations in war production. It was necessary to maintain some in order to provide food and other necessities for the troops in the demobilization period and for those required for occupation of axis territory. There was also need for large shipments of supplies to the devastated countries. These were mostly in the form of food, but considerable quantities of machinery were sent in an effort to restore the countries to a basis of self-sufficiency as soon as possible. The magnitude of these requirements was, of course, nowhere near the requirements of total war. Another factor retarding the production of civilian goods was the necessity of reconverting the war plants into efficient machines for the production of consumers' goods. Though individual companies converted more rapidly than expected, the resulting overall production machine was not in balance. Production in many factories was curtailed because of the shortage of component parts and the unfavourable labour situation. This set a lower level on the supply side of the equation than had been expected. On the demand side there was the normal demand plus the deferred demand for the durable goods not produced during the war. The deferred demand was not merely desire, but desire backed up by willingness and ability to pay from the accumulated savings of wartime.

Postwar Controls.—In view of these circumstances, it was decided not to drop wartime price control upon the surrender of Germany and Japan. Prices of a few of the uncontrolled commodities such as cotton and rye advanced markedly after victory and indicated the temper of the underlying situation. Farm and residential urban real estate also rose markedly in price. Prices received by farmers rose gradually during the war months of the year and then weakened slightly, but the gain in November and December left the wholesale price index of farm products at 131.5 or 4% above the level prevailing in Dec. 1944. Foods rose 3% and all other commodities 1%. This combination of rises resulted in a net increase of 2% in the combined wholesale index, leaving it at a level of 107.1 in Dec. 1945, as compared to 75.0 in Aug. 1939, the month before the start of the war in Europe, and 98.7 in April 1942, the month before the promulgation of the general maximum price regulation.

The various subsidies were, in general, continued throughout the year. Some subsidies were removed, such as that on butter, and the ceiling price was raised by the amount of the cancelled subsidy. Gradually, during the latter part of 1945 and the early part of 1946, ceilings were removed from various products if they were not essential to the cost of living and if supply was becoming adequate to answer demand at but a small increase in price. Some of the more important commodities decontrolled were fish, white potatoes and automobile parts.

In addition to the ceiling and subsidy removals, there were also substantial upward revisions of ceilings in the postwar months of 1945 and in the first half of 1946. Under these revisions, the combined wholesale price index increased from 105.2 in Sept. 1945 to 112.9 in June 1946, about 7%. The prices of goods other than farm and food products had held fairly constant during the war with the

index showing a rise of only about five points. It stood at 99.8 in Sept. 1945 and was up to 105.6 in June 1946; this rise in a period of ten months was greater than the rise during the whole time the United States was at war. It was almost entirely accounted for by ceiling revisions made in an effort to stimulate production of strategic materials in short supply and to compensate for wage increases given in settlement of the large wave of strikes called in this ten-month period. Increases of \$5 a ton were granted for steel and 75 cents a ton for pig iron. The prices of finished products in this industry rose 11%, whereas the increase to this time had amounted to about 4% from Aug. 1939, just before war started in Europe. Similar increases were granted for copper, lead, brass and bronze products in May. The next month increases were granted for products made from these materials. Prices of building materials also advanced about 10% in these first postwar months. This was, in part, an effect of increases in metal prices. Lumber prices rose markedly as shown by the index of these products which rose from 155.0 to 176—14%. This placed the price of lumber in June 1946 about 90% above the Aug. 1939 level. Many of the increases in these industrial products were allowed in the hope that they would bring out materials needed to start the large new housing program.

Prices of cotton goods and clothing increased 16% from the end of the war to June 1946. The increase appeared at all levels in the cotton goods industry and was required by terms of the Stabilization Extension act of 1944, which specified that all cotton ceilings were to reflect parity to the grower. Prices of household furnishings, according to the official indexes, rose about 5%. Prices of household furnishings purchased by the consumer, however, rose much more rapidly because of the disappearance of low-cost goods and the substitution of new and better-grade products.

Farm and food products prices were far less stable in this immediate postwar period than were the prices of industrial products. They took a sharp dip at about the end of the war, partly because of a bountiful harvest. Later they rose about 10% into June 1946. Again, most of this increase represented ceiling adjustments and subsidy cessations. In meats a large part of the ceiling increase was permitted in order to cover the rise in labour costs of meat packers which resulted from the settlement of the strike early in 1946.

An important problem that had to be solved by the Office of Price Administration was the establishment of ceilings for products the manufacture of which had stopped during the war. A considerable group of manufacturers and businessmen contended that the abandonment of price controls on these products and on products which had been available in short supply would result in greater production, now stifled by distorted price relationships, and that prices would decline as adequate supplies became available. But this point of view was not accepted. As these products came back onto the market, the prices were subject to control and, in general, were set on the basis of the 1941 prices plus amounts to cover increases in basic material costs and wage rates that had occurred since that time. Profit was to be allowed equal to the percentage of profit on sales which had been earned in the 1936–39 base period.

Labour's Pressure.—With the end of the war there was a cessation of overtime and night shifts and a reduction in working hours for labour. Though not reducing the

straight time wage rates, it did reduce the amount of take-home pay. Downgrading of labour classifications was also important. In addition, the series of price rises discussed above increased the cost of living. This combination of factors brought about a period of labour demands for higher wages in the spring of 1946, supported in many cases by serious strikes. During the period a general pattern of settlement emerged. The previous policy of holding the price line and allowing only such wage increases as could be absorbed by the manufacturer did not meet labour's demands, and a new policy began to emerge in Oct. 1945. Conformity to a set pattern of wage increases was encouraged by requiring prior approval of the new wage rate by the National Wage Stabilization board if the wage increase was to be used as a basis for price relief. The criteria for wage increases were broadened to allow for correction of gross inequities both within an industry and between industries. Basic wage and salary rates were also used, in place of straight-time hourly earnings which did not include the effects of upgrading and premiums for overtime and night shift work. Under the new policy, wage increases of approximately 17% were granted in certain prominent cases such as steel and automobile production. The increases ran between 5% and 15% in the furniture, clothing and building material industries.

The pressure for price increases during the ten months from the end of the war to the end of June 1946 thus came from three sources: increases granted in prices of basic commodities, gradual elimination of subsidies, and the further time required to achieve balance in the demand-supply relationship. During this period the inflationary gap of the war years had been reduced to a considerable extent, but consumers' disposable income was running 70% above 1941, whereas production of consumers' goods was only about 40% higher. In addition to this inflationary factor there was less willingness on the part of individuals to save from current income and to maintain the large savings balances built up during the war period. It was difficult to continue to resist the purchase of the small supply of long unseen goods when it was generally feared that there would be more price advances. Consumers were being urged to exercise caution on the ground that soon the supply of goods reaching them would increase tremendously (1) as the inventories of merchants reached a normal level in relation to sales and (2) as reconversion problems including labour and parts shortages were resolved.

The price control act was scheduled to expire on June 30, 1946. For several months congress had been considering legislation to extend controls, but marked differences in philosophy were emerging. One school of thought felt that controls with the attendant unwise pricing, unrealistic regulation, and long delays in obtaining relief were hindering reconversion and fostering the black markets. Another felt that the tight controls of wartime should be continued. A compromise bill was passed and sent to President Truman for his signature late in June. In his opinion the bill was not sufficiently strong and in vetoing it just before the expiration of the existing act, he asked congress to extend the existing bill a few days until new legislation could be passed. Congress did not oblige, and price control in the United States expired June 30, 1946. It was not until July 25 that a new bill became law, extending price control until June 30, 1947.

During the four-week period of price decontrol, prices of foods and many industrial materials advanced, but certain stabilizing influences were felt at once. One factor was the unwillingness or inability of consumers to pay the inflated

prices. A second factor was the restraint of manufacturers and distributors, who feared a buyers' strike, and a strengthening demand for a strong price control bill; the manufacturers also desired to maintain good will and competitive positions, especially if price controls were reinstituted with the consequent reductions in price. Also important was a feeling of individual responsibility for helping maintain the economic system intact. The increased supplies brought to market by the prospect of better prices would ordinarily have been a stabilizing influence, but with the prospect of reconrol, the market was demoralized by an effort to reap the reward of high prices while possible and by an attempt on the part of consumers to buy while possible, regardless of prices.

During the first two weeks of this period the bureau of labour statistics index of 28 basic commodities compiled daily from spot quotations showed a 25% rise. After that, however, the index leveled off. The 25% rise was not as disastrous as it first appeared. The cessation of all subsidy payments at once had to be reflected by an increase in price. The end of the black markets, which some observers said were patronized by a substantial percent of the people, made an effective price reduction even though the official figures showed a rise. The *New York Journal of Commerce* made a survey and concluded that more than 60% of the increase in the 28 basic commodity prices was attributable to the elimination of subsidies and the ending of black markets. The bureau of labour statistics figure showing a 25% rise was also questioned because of its inclusion of a figure for raw silk, for which a normal market had not been maintained throughout the war. Because of the construction of this index, single isolated transactions in this commodity had a disproportionate effect.

Final Attempt at Control.—The passage of the new price control act was reluctantly received by many. It was generally felt that the cessation of price control inevitably would bring a marked adjustment in the economic situation. Now that the adjustment had been partially completed, two more adjustments were necessary: back to controls and eventually an adjustment to a free market. The new bill set up machinery for and expressed the intent that all price controls were to end with the expiration of the act June 30, 1947. The plan was for orderly decontrol throughout the year according to a schedule written into the law. The Price Decontrol board had authority to accelerate this program when the demand-supply relationship warranted. The decision to control prices on grains and animal products, cotton seed and soybeans, tobacco and petroleum and their products was deferred by law until Aug. 20.

Under the new act a three-man Price Decontrol board was established. This board had review powers in cases of dispute about specific ceilings and was responsible for deciding whether any decontrolled commodities should be placed under ceilings and what action should be taken with respect to subsidy payments. It was also given control over the decision to control or not to control various farm prices, which by terms of the act became eligible for reconrol on Aug. 20. The criteria for the decision to reconrol these or any other products were threefold: that the price had risen unreasonably since the expiration of the former act after making allowances for cessation of subsidies, that the supply was short and that regulation was practical and enforceable, and that such reconrol was in the public interest. The first major decision of this board was that livestock, meat and oilseeds were to be reconrolled but that grains, dairy products and other farm products were to remain free. The board had power to

order the reconrol of these products at any time such action was deemed necessary.

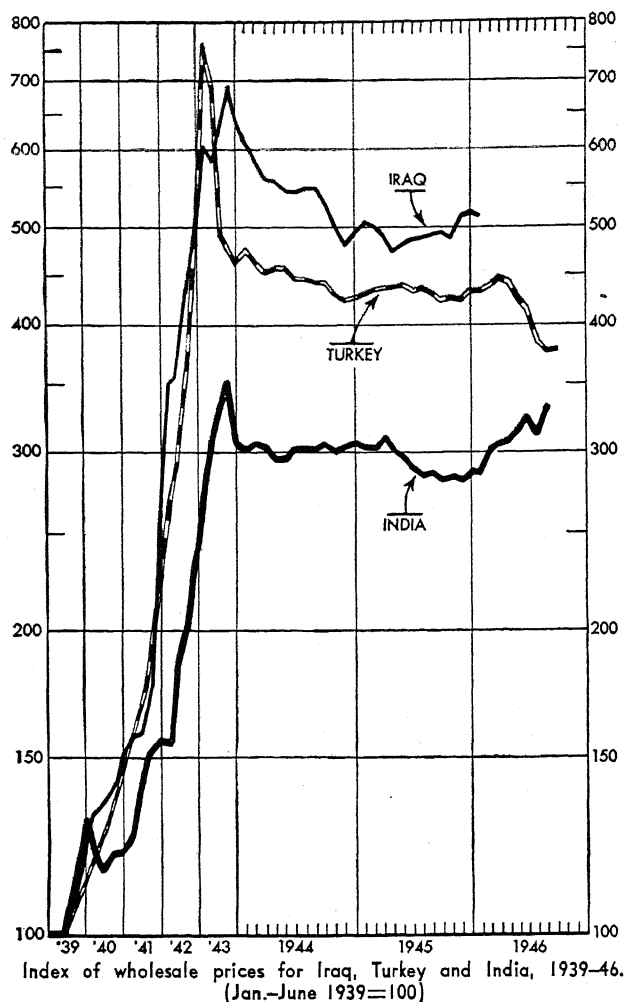
Another provision of the act required that all subsidies (reduced by the act to a level approximately half that of the preceding year) be eliminated by April 1, 1947, except subsidies on copper, lead and zinc, which might extend until June 30, 1947. In addition, the act specifically directed the president to recommend to congress legislation along monetary and fiscal lines which would aid in the control of prices before and after the termination of the price control act, in order to minimize the danger of inflation during and after the decontrol period.

Immediately after the act went into effect the ceilings of June 30, 1946, were reimposed in most cases not prohibited by law. Many were revised promptly. Some were in process of revision at the time of the expiration of the former act, and other revisions were made necessary by developments during the free period. New rules for ceilings on manufactured products were made in the act, presumably directed to the stimulation of production. One of the most important was the provision requiring ceilings on manufactured products to be equal to the base period price for the product plus a percentage adjustment based on average cost increase on the product to the industry as a whole. The base period was also changed from the 1936-39 average to 1940, thus providing larger profits and a greater stimulation to produce. Relief was likewise provided for distributors by allowing increases in their ceiling prices to compensate for increased prices from manufacturers instead of requiring distributors to absorb these increases as they were required to do under the regulations of the previous act. Wage stabilization controls were also maintained through the provision that price increases need not be allowed to compensate for unauthorized wage increases.

In the first three months after passage of the act it appeared that manufactured goods prices were rising to compensate for the increased costs and that production was continuing more smoothly. Labour, of course, had the opportunity to make new wage demands to compensate for the increased cost of living. Most of the strikes, serious though they were, were local in character. The only ones of broader proportions affected ocean shipping by tying up United States ports. These strikes did not directly affect the price of manufactured products.

With respect to food prices, the situation was quite different. Prices of certain farm products did not rise greatly. These were products in which bumper crops were expected. The reconrol of meat prices on Aug. 20, 1946, was accompanied by a drying up of the huge meat supplies brought to market in the "free" period. The shortage of these products diverted demand to dairy and other products with prices not subject to control. The latter price rises, in addition to a general public demand for dropping meat controls, led to a presidential directive on Oct. 14, decontrolling meat prices and accelerating the decontrol time schedule.

On Nov. 9, 1946, President Truman removed practically all remaining controls over prices and wages. He pointed out that a large proportion of the economy had already been freed of controls under the decontrol provisions of the new act, and that continuance of price control regulations would bring with it disadvantages of lack of balance in the economy more serious than any price increases likely if prices were free from controls. Since most farm products had already been freed, price changes in these as



a result of the presidential order were minor. The major changes occurred among certain basic industrial commodities and manufactured products. Many of the industrial raw materials showed marked increases in prices, but the price quotations were not wholly accurate because of the partial elimination of the practice of upgrading which had been carried on under OPA regulations. These price increases were expected to work their way through to manufactured products, but for the remaining two months of 1946 manufacturers were trying to maintain their former prices. There were some notable exceptions, especially when in one day General Motors corporation announced a flat \$100 increase in the price of their automobiles and General Electric company announced an increase in the price of their products averaging 30%.

The work stoppage in the bituminous coal mines from Nov. 20 to Dec. 7, 1946, added to the inflationary tendencies by retarding the availability of still scarce goods. However, the remaining three weeks of the year did not allow sufficient time to show clearly the effects of this strike on prices.

At the end of the year only residential rents, rice, sugar and sugar syrups remained under price ceilings. Sugar and rice controls were expected to be removed later, but the need for continued, but possibly revised, ceilings on rents was generally recognized. Transfer of the rent controls to state administration was under consideration.

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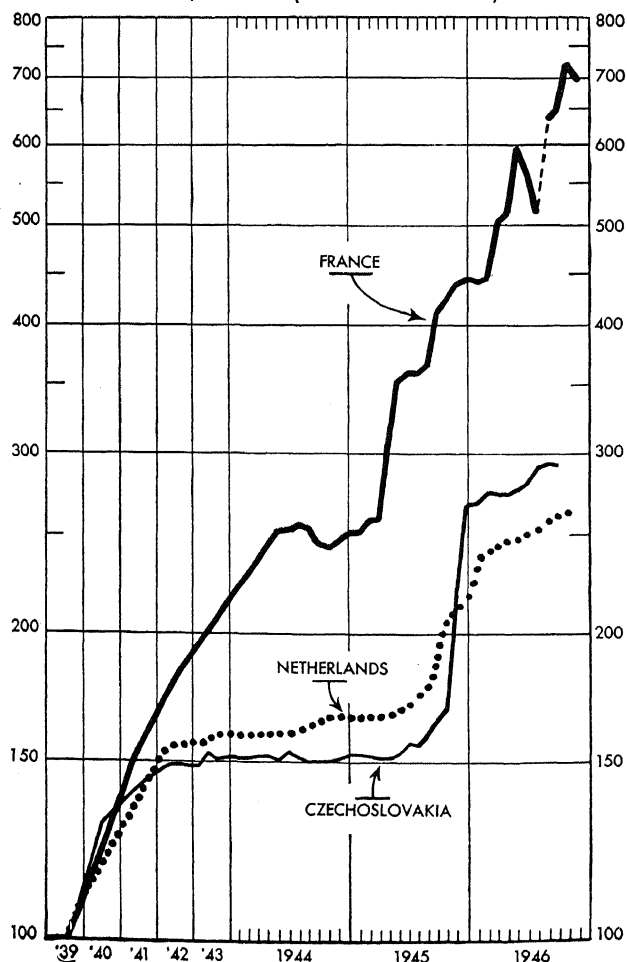
Great Britain and the Commonwealth.—The ten years ending in 1946 witnessed a marked rise in prices throughout the countries of the British commonwealth. The financing of World War II, as that of World War I, was bound to produce an all-round upswing which was strongly accentuated by the scarcity of the supply of goods and of labour. The degree to which these factors affected the price levels in various countries varied widely, according to the circumstances of the countries concerned.

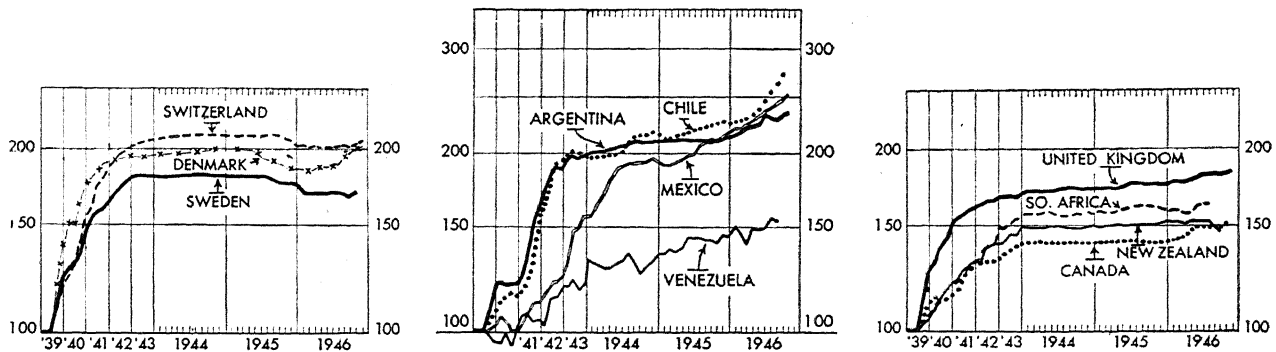
The last two prewar years showed remarkably conflicting trends. The business recession which developed in 1937 caused wholesale prices to fall, in spite of the growing demand for rearmament requirements. On the other hand, the cost of living in many countries continued to rise; at best, it remained more or less stationary. The explanation lay in the time-lag usually elapsing between changes in the trend of wholesale prices and of the cost of living.

Before the cost of living could begin to reflect receding wholesale prices, the latter resumed their upward movement, as a result of the war. Practically everywhere, there was a constant rise in wholesale prices and in the cost of living. Even after the termination of the hostilities, prices within the countries of the British commonwealth continued to move upward.

The fairly marked drop in wholesale prices in the United Kingdom before the war was followed by a rise which, by 1946, had lifted them about 74% above prewar level. Of this rise, the first 20% may be accounted for by the devaluation of the pound at the beginning of the war, so that the rise in terms of gold or dollars was only slightly

Index of wholesale prices for France, the Netherlands and Czechoslovakia, 1939-46. (Jan.-June 1939=100)





Index of wholesale prices for Switzerland, Denmark, Sweden, Argentina, Chile, Mexico, Venezuela, the United Kingdom, South Africa, New Zealand and Canada, 1939-46. (Jan.-June 1939=100)

over 50%. The cost of living was kept down with the aid of price control and subsidies, so that in 1946 it was only 32% above its prewar level. Allowing for the devaluation, the rise in real terms was only 12%.

Some of the countries of the British commonwealth were even more successful in keeping their prices down after 1939. In Canada, wholesale prices rose only by 41%, and the cost of living by 19%. The rise was 39% and 23% respectively for Australia and 58% and 32% respectively for South Africa. The currencies of the last two countries had been devalued by 20% in line with the pound sterling, so that in terms of dollars the rise in their price levels was very moderate indeed.

In India, on the other hand, the increase in price levels was far more pronounced. Considerable inflation of purchasing power developed on account of difficulties in raising adequate amounts for war finance.

Continental Europe.—On the European continent the rise in prices was much more extensive than in Great Britain. Some countries, even though neutral, were less successful in checking this upward trend. In Switzerland, for instance, wholesale prices more than doubled, and the cost of living rose by 58%. The rise was even more pronounced in Spain, but was more moderate in Sweden. Wholesale prices in Portugal rose by about 150%.

Some of the countries that came under German occupation succeeded reasonably well in keeping down prices. In this category were Denmark, Norway and the Netherlands, where the rise was not more pronounced than in neutral countries despite the heavy occupation costs imposed on them and the inflationary effect of various German methods of economic exploitation. On the other hand, they had very little military expenditure, while in neutral countries the necessity of maintaining substantial defense forces combined with purchases by belligerent countries had a cumulative effect on the price level. The rise in wholesale prices was 72% in Holland, 82% in Norway and 94% in Denmark.

France, on the other hand, experienced a much greater price inflation during the war, and especially after the war. While the Low Countries and the Scandinavian countries succeeded in bringing their prices under control soon after liberation, internal political and social conditions in France made it difficult for the government to check the rise. The necessity of devaluing the franc, and the anticipation of a further devaluation acted as contributory factors. The official price index could not adequately reflect the full extent of the rise, as a very large proportion of commodity and other commercial transactions took place in the black markets (*q.v.*), where prices were much higher.

Among the liberated countries, Greece suffered worst. A runaway inflation developed which sent prices to astronomical figures, surpassing even those of the German inflation of 1923. Although the currency was drastically devalued in 1944, an attempt at stabilizing prices was not very successful. The following two years were marked by further considerable inflation.

The axis countries also experienced substantial price increases, especially after their defeat. In Germany prices had been kept well under control during the war, but with discipline relaxing after the collapse, a sharp upward movement occurred, the extent of which varied in the different zones of occupation. In any case, officially quoted prices ceased to have any meaning. Trade in articles other than rationed goods was confined to the black market and to barter transactions. In Italy, the rise in prices was relatively moderate until 1943, but after the surrender, under the combined effect of Allied and German occupation and of the defeat, a very sharp rise occurred which continued even after the Italian authorities had taken full charge and had checked the issue of paper money. Among the satellite states, Hungary experienced wild inflation similar to that of Greece. Thus, in June 1946, the cost of living index had reached 166,000,000,000,000,000% of the average of Jan.-June 1939. In Rumania, too, prices rose very sharply. On the other hand, Finland and Bulgaria succeeded in keeping their prices in check to a reasonable degree. (See also AGRICULTURE; BUSINESS REVIEW; CONSUMER CREDIT;

Price Indices 1937-46

	S. Africa		Canada		India		Germany		Denmark		Spain		Sweden		Switzerland		United Kingdom		Australia		New Zealand	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
1937	87.0	90.5	88.4	83.2	72.0	106.0	77.2	81.2	110.0	104.5	112.4	—	114.0	96.0	78.8	84.9	95.2	94.0	89.1	84.9	103.4	91.9
1938	90.0	93.8	82.2	84.0	68.0	106.0	77.1	81.6	104.0	106.0	126.4	—	111.0	98.0	75.8	85.1	88.8	95.0	88.8	87.2	104.9	94.7
1939	87.8	93.7	78.8	83.4	76.0	106.0	77.7	82.0	109.0	108.6	144.2	154.0	115.0	101.0	78.7	85.7	90.0	96.0	89.0	89.4	108.4	98.6
1940	97.5	97.0	86.7	86.8	85.0	112.0	80.2	84.5	159.0	135.4	172.2	138.0	146.0	114.0	101.3	93.7	119.6	112.0	98.0	92.9	121.0	103.1
1941	107.1	101.5	94.0	91.9	99.0	124.0	81.8	86.5	188.0	157.2	203.6	231.0	172.0	129.0	130.0	108.0	133.6	121.0	104.0	98.0	132.7	106.9
1942	120.2	110.0	100.0	96.1	131.0	157.0	83.4	88.7	197.0	163.0	223.8	247.0	189.0	140.0	148.4	120.1	139.6	122.0	117.0	105.7	143.3	110.5
1943	130.7	116.7	104.5	97.3	218.0	230.0	84.8	89.9	198.0	165.0	249.9	246.0	196.0	141.0	154.5	126.2	142.6	121.0	123.0	109.9	153.4	—
1944	135.3	120.8	107.2	97.7	211.0	237.0	85.7	91.8	201.8	167.0	265.6	256.0	196.0	143.0	157.6	128.9	145.5	123.0	124.0	109.5	158.3	—
1944*	158.0	132.0	141.0	119.0	244.0	227.0	—	—	194.0	159.0	216.0	186.0	178.0	144.0	200.0	153.0	174.0	132.0	139.0	123.0	151.0	—
1946†	163.0	135.0	149.0	124.0	264.0	250.0	—	—	188.0	157.0	—	—	170.0	144.0	202.0	152.0	178.0	133.0	140.0	125.0	153.0	—

A=Wholesale Prices

B=Cost of living

Basis for all figures from 1937 to 1944 inclusive: 1929=100

*Basis Jan.-June 1939=100

†June 1946

‡Average Jan.-Sept. 1944

§Average Jan.-Oct. 1944

INCOME AND PRODUCT; LAW; PRICE ADMINISTRATION, OFFICE OF; STOCKS AND BONDS; WAGES AND HOURS; and articles on individual commodities.) (P. E.G.)

Primary Education

See EDUCATION.

Prince Edward Island

Nestling in the Gulf of St. Lawrence in the curve provided by the eastern shore of New Brunswick and the northern shore of Nova Scotia, and separated from them by Northumberland strait, Prince Edward Island is the smallest Canadian province, with an area of only 2,184 sq.mi. It entered the confederation in 1873.

The 137-mi.-long island is the most densely populated province, though it has the fewest people. In 1941 there were 43.5 persons to the sq.mi., and since 71% were on the land it was Canada's most compact farming community. However, wartime enlistments and the lure of high-paying industrial jobs in Ontario caused a sharp population decline after 1941. In 1946, with 4,000 uninhabited homes, mostly rural, it was the only province not suffering from a housing shortage. The population figures were: (1931) 88,040; (1941) 95,047; (1946 estimate of dominion bureau of statistics) 92,000. Centres of population in 1941 were: Charlottetown, the capital, 14,821; Summerside, 5,034; Souris, 1,114.

There were no other towns with populations of more than 1,000.

Racially, 80% of the 1941 population was British and 16% was French. Persons of Dutch ancestry were the next largest group. About 42% of the people were Roman Catholics, 28% belonged to the United Church of Canada, 18% were Presbyterians, 6% Anglican.

Lieutenant governors for the 1937-46 decade were G. des Brisay DeBlois (Dec. 28, 1933-Oct. 1, 1939) and Bradford W. LePage (after Oct. 2, 1939). Premiers were Thane A. Campbell (Jan. 14, 1936-May 11, 1943) and J. Walter Jones (after May 11, 1943).

Except for the drop in population, and the large increase in productivity—from \$19,000,000 in 1935 to \$32,000,000 in 1944—because of World War II, little of a spectacular nature occurred on the island during the 1937-46 decade. The Liberals remained in power, winning all the 30 legislative seats in 1935, 27 of them in 1939 and 20 in 1943.

Like other governments, the Prince Edward Island administration took steps towards the end of the war to secure the provincial economy for the postwar period. To promote and co-ordinate plans for employment, a Department of Reconstruction was established in 1944. In the same year an agricultural survey was

undertaken, and an Advisory Reconstruction committee was appointed to organize work projects on education, tourist and transportation, rural electrification, housing, finance and revenue, fisheries, agriculture, public health and welfare and forestry. In 1945 the government enacted measures relating to town planning and electric power supply. During 1946 the per capita rate of return-to-the-land veterans was so high that the island government's technique was studied by the other Canadian provinces.

The most dramatic incident of World War II on the island was the torpedoing by a nazi submarine of one of its railway car ferries, chief link to the mainland. Only one ferry was left in operation, and it was inadequate for handling export-import freight. New and more powerful ferries were designed, one of which was put in operation in 1946; but its engineers made an error and the boat was unable to use the island terminal at low tide. Another ice-breaking ferry was nearly ready for service by the end of 1946, and that year the federal government spent \$5,000,000 to extend the Cape Tormentine and the Borden terminal piers, to reduce ice hazards further. There was much talk of a causeway or tunnel to the island, in order to give it the transportation services promised when it entered the confederation, but nothing was done. Air service, however, was established during the early part of the decade, and was of prime importance by 1946.

By 1946, also, tourism was considered the island's third great industry; an increasing number of vacationers appreciated the cool summer climate and the almost unbroken fringe of excellent bathing beaches that circle the island. The government's program to maintain and increase this tourist interest included widespread publicity.

In 1945 the island was used as the test province for the federal government's family allowances, and the experience gained through the advance registration of children on the island enabled the registration elsewhere to go smoothly.

During the decade, Prince Edward Island was much embarrassed by lack of provincial revenues. Unlike other provinces, the island did not have large blocks of public

Prince Edward Island: Statistical Data

Item	1938 Value (000's omitted)	1941		1944	
		Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)
Exchange rate					
Great Britain . . .		4,867 Canadian \$ = £1		4.45 Canadian \$ = £1	
United States . . .		1 Canadian \$ = 99.4 cents		1 Canadian \$ = 90.9 cents	
Finance					
Provincial revenues .	£385 (\$1,883)		£484* (\$1,951)		£494† (\$1,992)
Provincial expenditures .	£402 (\$1,963)		£481* (\$1,940)		£625† (\$2,523)
Transportation					
Railroads		286 mi.		286 mi.	
Highways		3,650 "†		3,706 "	3,706 "§
Communication					
Telephones		5,473		5,887	7,260
Telegraph lines . . .		4,198		6,337	285 mi. §
Radio sets					10,228 §
Crops					
Hay and clover . . .	297,000 tons		368,000 tons		382,000 tons §
Potatoes	215,000 "		159,000 "		258,000 "
Turnips	159,600 "		102,000 "		197,488 "
Oats	78,000 "		75,000 "		70,000 "
Livestock					
Cattle	100,000		94,000		106,000 §
Sheep	49,000		44,000		60,000 §
Swine	44,000		48,000		60,000 §
Horses	29,000		28,000		27,000 §
Manufactures					
Total	£721† (\$3,567)	...	£767† (\$3,403)	...	£2,157† (\$8,705)
Butter and cheese . .	£149† (\$738)	...	£141† (\$625)	...	£451† (\$1,818)
Fish processing . . .	£126† (\$622)	...	£133† (\$591)	...	£641† (\$2,588)
Printing and publishing . . .	£35† (\$175)	...	£42† (\$185)	...	£48† (\$192)
Sawmills	£31† (\$153)	...	£28† (\$123)	...	£53† (\$212)
Education enrolment					
Provincial schools . .		18,191		18,194	17,179
Private schools . . .		725		806	1,000
Dominion Indian schools		15		16	23
Universities and colleges . . .		657		673	940
*15 months. †Provisional figures.		†1937.	§1945.	||1939.	¶1943.

lands, rich natural resources in mine or forest nor taxable big corporations. Thus, many of the social services common to other parts of Canada were not available to islanders. The government was active in trying to increase the provincial subsidy received from the dominion government.

Despite the increase in per capita national income from \$185 in 1939 to \$385 in 1944, the province was still at the bottom of the list in this regard. It was also at the bottom of the list in the number of radios and telephones per hundred persons. (C. Cy.)

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Principe

See PORTUGUESE COLONIAL EMPIRE.

Printing

Aside from the invention of such important machines as the linotype and monotype and the basic principle of offset printing, the decade 1937–46 saw more new developments than in the preceding five decades. Methods improved and standard machines were speeded up. Furthermore, there were indications of a trend toward a quite different technique with science, including chemistry and electronics, playing a progressively larger part.

Paper, rollers and ink are as essential to printing as presses, and despite the years of World War II when paper and ink quality—the former, particularly—deteriorated for lack of essential materials, there were advances in development of improved finish, better surfacing methods, waterproofing, scuff-proofing, receptivity to ink, writing quality, and so on.

Developments in the quick drying of ink to keep pace with increases in press speeds marked the era. Following heat-set and cold-set inks, so-called water-set inks were developed during 1941. Applied as a vapour, either as a spray or in the form of steam, water causes ink to set quickly and prevents excess penetration, the latter making the method especially adapted to containers and cartons. Most widely employed was the heat-set method, which permits practically instantaneous drying of inks, the ink vehicle being vapourized by the application of heat, leaving a relatively dry ink film on the surface of the paper.

Another contribution of a scientific nature was the use of several rubber-like materials to supplement composition and rubber press-inking rollers. These possess strong wearing qualities as well as resistance to vehicles used in inks and solutions for washing rollers.

Letterpress advanced during 1941 through the development of facilities for making original etched plates curved to fit the press. For rotary relief printing it had been necessary to make flat original plates and from these cast electrotypes or stereotypes (duplicates) in the required curved form. The new invention obviated the need for the duplicate plates in many instances.

In the step and repeat process, offset had long had an individual efficient method of putting down on one press plate—to micrometer exactness for position and register—the number of pages or designs required for capacity of press or sheet to be printed. In the time required for preparation before starting a press, relief printing was at a distinct disadvantage since forms had to be made up from separate units, register being finally achieved by trial and error. Equipment providing the single plate of multiple pages or items exactly spaced as in offset also came to letterpress in 1941.

Several highly advantageous applications of plastics were

made to printing; the most extensive was in producing duplicate plates from moulds of photoengraved line and halftone engravings. Such plates were not only made of plastic but moulded from mats of that material, modified. Big advantages were simplicity of making, comparative low cost and light weight (one-eighth that of an electrotpe). Moulds of plastic were increasingly used for making standard duplicate plates by electrodeposition of copper. Silver, rather than black lead used for customary moulds, was the conductor. The silver, incidentally, eliminated dirt accompanying black lead. A lead mould permitted of but one face shell for electrotypes whereas plastic moulds could be used repeatedly.

A pioneer manufacturer of plastic material announced that single types had been cast for setting large display lines from nylon. A slug (line of type in one piece) was cast from plastic material with a standard line-casting machine. While the experimenter admitted the job was difficult and time-consuming, and the printing surface was imperfect, the cast was made. Use of the material for etching original plates and for moulding curved duplicates had not as yet been accomplished.

An important development of the decade was a composition plastic and processed paper press plate for offset printing. Flexible, it was composed of equal parts of paper and plastic, the latter forming the printing surface, the paper flexibility. Cost was materially less than that of zinc and aluminum, heretofore used for offset plates. A government printing office executive reported a run of 100,000 from such a plate.

The industry harnessed the science of electronics for important uses. One application was to drives on large newspaper and magazine presses. Use of the electronic Luxometer eliminated inaccurate measurement of exposure time. It automatically measured time required in lumens, units of light intensity. It not only gauged and supplied the correct amount of light required for the subject but insured correct tone and colour values.

A press functioning upon an entirely new principle—and the invention of a respected technician—was being built in Chicago, Ill. It was not only adaptable to all major printing methods—relief, planographic and intaglio (letterpress, offset and gravure)—but, to mention the new principle which suggested the term “pressureless” printing, printing without contact between the plate and paper, ink with a metallic content “jumping” from inked plates to paper through electromatic or electrostatic forces exerted by the electronic tube. Because presses could be built lighter in relation to form and run more freely since cylinders do not grind against each other, speed seemed limited only by the speed at which the cylinders could be made to revolve.

Photoelectric colour register control was applied in a number of plants. A pioneering step in colour gravure printing was undertaken in the application of photoelectric equipment to register automatically three colours on one side of a web of paper and four on the opposite side, with the paper running through the press at the rate of approximately 1,200 ft. a minute.

One of the most dramatic graphic arts development of the decade was that of the *Chicago Tribune* in publishing a full-page, full colour illustration of “The Big Three” (Truman, Attlee and Stalin) meeting at Potsdam, Germany. Colour separations for making the plates were sent by radio. The manner of transmission was equivalent to that of sending black and white pictures (or other copy)

638 by facsimile. The colour photograph, placed on a revolving cylindrical drum, was scanned by the magic photo-electric eye in connection with red, green and yellow filters. Filtering was made possible by the ratio between the speed of the drum and colour wheel. The picture came to the receiver as three different negatives to be combined for three-colour prints or employed as separation negatives for process colour plates.

Automatic production of photoengravings was forecast at the end of the decade. One of the developments was a device for mechano-scientific "tooling" rather than etching so-called halftone plates. Essentially the mechanism had two parts, (1) the electric eye (scanner) and (2) a v-shaped cutting tool. Where a photograph was light as scanned, more power was applied to the cutting tool and ridges of the parallel grooves became thin. Conversely, where copy was dark proportionately, less power was applied and the ridge was thicker. When finally the whole picture was covered, the combination of the printing ridges (80 to an inch) produced the varying tone values of the photograph in a printing plate.

Infra-red, another magic of science, was also applied to printing. The first use was for drying printed sheets coming off a press. Extensive uses of the infra-red rays were burning in top enamel on photoengraved plates and baking albumin on offset plates. The infra-red oven supplanted hand methods, and did the work both better and faster.

The rapid growth of offset led many to believe that photography would play a much greater part in printing.

Development in colour photography proceeded at a rapid rate, and colour film permitting studio—even home—development was marketed. The Kodak Fluorescent process, developed in 1942, improved on the method of reproducing full-colour illustrations and speeded up the making of plates. Pictures are painted with water colours which fluoresce in ultra-violet light. This fluorescence so improves the red and yellow that colour correction is practically perfect. Although invisible in ordinary light, the bright fluorescence, which fully effects red and yellow colour correction, makes a striking display in a darkened place under strong ultra-violet rays. Photography for blue and black plates is accomplished, however, with white light only falling on copy. Another outstanding contribution to the betterment of printing (lithography) was a contact screen of Eastman Kodak company. For fidelity it was said to be the nearest approach to continuous tone reproduction—that is, most like a real photograph.

The remarkable Iriscope translates black and white photoprints taken with an uncorrected lens back to the original colours. This is possible because each ray of colour forms a pattern at precisely the same depth in the film every time. When a positive is made, using the filter, the picture appears in the original colours.

Further development of microprinting was in progress. Microprinting held the possibility of a profound influence upon the industry, and a reduction in the volume of regulation book printing. Through it the text of a book may require only the back of a library file card or a 6- by 9-inch sheet attached to it on which, with face and back micro-printed, as many as 200 pages may be provided. The method saves binding, labelling, shelving and storage space. It was said to be superior to film which must be projected for reading.

Brought into use just prior to World War II were cameras providing lettering for display printing which previously required the services of expert artists. The so-called

photo-lettering machine composes photographic images of individual letters and designs into words or patterns upon the film, paper or dry plates. It permits condensing, expanding, reducing or enlarging the lettering (or other copy) in one direction only. Lettering with a back slant as well as the usual slant to the right is accomplished.

What was believed to be the first machine for photo-composition of type matter in actual production was being tested in the government printing office. The basis is the standard line-casting machine. Mats are assembled and sent along as if to cast a line in metal. Then the operation becomes quite different. Instead of being engraved and on the narrow side of the mat, the character is in transparent form set into the mat on the wide flat side. When the row of mats is brought in front of the camera section, the mats, one at a time, are caused to move to aperture and are photographed. The row of mats is justified in the first place with usual spacebands between words. There is mechanical provision for allotting to single letters the exact space each individual letter requires in the line, when finally complete on the film, as in the row of mats. After exposure of one line, the spool of film is caused to move whatever space is desired for the following line, et cetera. In the end, a negative for the type matter of book page or newspaper column is obtained. Photocomposition would be a boon to offset and gravure printers, obtaining negatives at one operation, instead of setting the type and taking most careful proofs to be used as copy for making negatives with a camera.

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Great Britain.—During World War II the printing industry in Great Britain was not able to consolidate the steady technical progress of the immediately preceding years. Nearly half of the industry's labour force, male and female, entered the armed forces or were transferred to munitions, aircraft or other war production. All paper supplies were strictly controlled, and the industry suffered

from the acute shortage of both manpower and materials. Readability of printed matter was reduced by the use of smaller sizes of type on inferior paper stocks, and artistic presentation suffered further by restriction of paper margins. The use of colour was also limited as sheets were allowed to pass only twice through the machine, and printing inks seriously deteriorated as a result of lack of suitable raw materials.

Practically all supplies became short and inferior in quality; repairs to machinery were carried out with very great difficulty and as priority work. Extensive destruction was caused to machinery of the printing and allied industries in the air attacks on the large cities of the country. Many printing factories were destroyed or severely damaged in London, Liverpool, Manchester, Birmingham, Bristol, Coventry and many other cities and towns. Book production was unable to keep pace with an increasing demand from the public, and 1946 found book printers, and especially binders, seriously in arrears with orders. Owing to shortage of paper, poster production was limited commercially, although some excellent work was done for the government, almost exclusively lithographic.

The most spectacular development during the war was the adoption of mobile and semimobile printing units for the military services. Letterpress printing units were used on a small scale, having both hand and mechanical typesetting, but far wider use was made of lithographic units, chiefly for the printing of maps. Compact equipment of the most up-to-date type was used and transported in special trucks to the vicinity of military operations. The units were self-contained and were able to prepare copy, make photographic plates, produce printing plates and print on automatically fed lithographic offset machines. In Britain the most up-to-date gravure plants did work which was notable rather for speed of production than for the higher quality of production for which they were designed. Work was primarily for direct war purposes; magazines were produced for the forces, and huge outputs of propaganda literature were produced and released from planes or projected over axis territory almost before the ink was dry. Wide development was noted in autolithography both for children's books and for coloured book illustration.

France.—During the German occupation of France, paper was extremely scarce and of low grade. With the return to settled conditions there was hope of great progress in metal decoration by lithography. The success of the Letouzey process for the reduction or elimination of makeready on the letterpress machine for bookwork caused universal interest.

Germany.—In the years before World War II much printing was exported from Germany, not because of its excellence but because of subsidies. On the other hand, there was a fairly regular flow of reproduction work which reached a very high standard of quality. Notable in this class were the exquisite collotype reproductions of master artists, distributed throughout the world. The best photogravure productions in two, three and four printings set a standard difficult to equal. Much photolithographic reproduction in four, five and six printings was particularly well done, and the type of copy most widely used was the natural colour photograph of the Duxochrom variety. These colour photographs were produced on a generous scale throughout the war and their reproduction continued during the occupation, particularly in the Russian zone. In all these cases the best work was produced by a small number of specialist firms. Four-colour litho reproduction for books was also well done. Another technique was the

use of multicolour reel-fed gravure machines for full colour insets, magazines and advertising matter, both sides of the web being printed simultaneously in some cases. At the end of 1946 much of this specialized machinery lay buried among demolished buildings, and its salvage depended on permission from the occupying powers. Mobile printing units for use with the German military forces were used on a negligible scale, a remarkable exception being a train fully equipped for the production of newspapers.

Netherlands.—Dutch printing reached a standard not generally appreciated outside the country's own borders. The three main processes were used progressively. Although subjected to German domination during the greater part of the war, the Dutch printing industry quickly rehabilitated itself after liberation, and as a result of war dislocation of the printing industry in England and postwar labour difficulties, a fair amount of book printing for British publishers was being produced in the Netherlands toward the end of 1946.

Switzerland.—Although Switzerland was not directly engaged in World War II, it suffered considerably from lack of trade; its usual imports of supplies and raw materials were seriously restricted. The quality of printing was generally high in Switzerland, and magazine production was developed with wide use of colour both by letterpress and gravure processes. Before 1937 Switzerland had introduced more intensive study of the graphic arts into technical schools, and this later had a healthy effect on book production and illustration. After 1940 a progressive and considerable rise took place in book production in German, French, Italian and English. Many cultural books were printed for France during the war. The progress of lithography was well represented by a 356-page book published in 1944 entitled *Die Lithographie in der Schweiz und die verwandten Techniken, 1894-1944*. In no other country in the world was the screenless lithographic photochrome process used to the same extent or developed to the same excellence as in Switzerland. (See also BOOK PUBLISHING.) (A. Kk.)

Printing Office, U.S. Government

The U.S. government printing office, located in Washington, D.C., is generally recognized as the largest and most complete printing plant in the world. In 1946 it occupied three eight-story office buildings and a four-story warehouse, aggregating 33 ac. of floor space. It contained complete typesetting, proofreading, press and bindery divisions; a foundry for casting stereotype plates; a platemaking division for half tones and line cuts, as well as plastic and rubber printing plates; machine shop, carpenter shop, paint shop, etc.; a maintenance division for the care and upkeep of buildings and equipment; and its own guard force, trusted with protection of the \$16,233,117 plant and its product.

The printing office is administered by the public printer, appointed by the president of the United States by and with the advice and consent of the senate. According to law, the public printer "must be a practical printer and versed in the art of bookbinding," and must be required to give bond in the sum of \$25,000 "for the faithful performance of the duties of his office." His salary was fixed at \$10,000 a year.

The Public Printing and Documents law required: "All printing, binding, and blank-book work for Congress, the Executive Office, the judiciary, and every executive depart-

ment, independent office, and establishment of the Government shall be done at the Government Printing Office, except such classes of work as shall be deemed by the Joint Committee on Printing to be urgent or necessary to have done elsewhere. . . ." It also stated that printing, binding and blankbook work which the public printer is not able or equipped to do may be procured elsewhere under contracts made by him.

The government printing office was authorized by act of congress on June 23, 1860, and opened for business on March 23, 1861. The original building and equipment were purchased intact from a private printer who had established a large plant in 1856 in the hope of being commissioned to perform the public printing. As the printer to each house of congress was elected annually by the members of that house, no printer could depend on the work from year to year. In 1861, the new government printing office employed 300 men and women as compositors, pressmen, bookbinders and labourers, with wages for craftsmen set at \$14 a week. In 1867, the government's total printing bill was \$1,631,000, divided as follows: executive departments, \$757,000; house of representatives, \$455,000; senate, \$186,000; miscellaneous, \$233,000.

As the government grew and became more complex, the volume of public printing increased and the printing office expanded to carry the load. Printing became more than ever an essential element of national legislation. The information furnished in printed documents was indispensable to legislators framing bills and drawing up reports. On June 30, 1937, 5,594 employees were on the payroll of the office, and the total dollar value of their product was \$18,163,977.24.

Although additional buildings, one in 1900 and one in 1928, had been added to the original office (which was built in 1856), lack of floor and storage space was a severe handicap in handling the ever-increasing volume of work. In 1936, congress authorized the erection of a warehouse building and a new office to replace the original structure. The warehouse was completed in 1938 and the office building in 1941 (though parts of it were occupied late in 1940). Obsolete and worn-out equipment was replaced by efficient, modern machines, some of which were built to order to handle types of work peculiar to the government.

* * *

THE ONSET of the emergency of World War II made itself felt in government printing in the 1940 fiscal year. It found the printing office in better condition to meet additional demands than it had ever been before. During the 1941 fiscal year, however, it became evident that it would be impossible to produce all necessary public printing in the office, with the plant, equipment and personnel then available. The public printer decided that it would be to the long-term interest of the government to procure surplus printing, under contract, from commercial publishers rather than to expand the government plant beyond reasonable peacetime needs. By 1942, procedure for commercial purchase of surplus government printing was well established, and for the first time since 1860 private printers were producing general government printing office work under contract.

Demands for printed matter continued to increase as the United States rapidly swung into its all-out war effort. In the five years 1941-45, inclusive, the total value of public printing showed an increase of 223.8% over the period

of World War I (1916-20, inclusive). From \$18,000,000 in 1937 the total grew to \$78,000,000 in 1943. Machinery for commercial purchase established early in the war proved inadequate for the volume which had to be bought. Paper and other printing supplies became increasingly scarce and difficult to procure. Transportation facilities were jammed and near the point of collapse. It was essential to bring more and more printers in all parts of the country into the government program in order to obtain the needed volume. It was also necessary to produce printed matter near its distribution point to relieve overburdened transportation systems. At the same time, it was obligatory that all printing be produced under close supervision of the government printing office in order to protect the public interest. To accomplish these ends, the public printer established warehouses in New York city, Chicago, San Francisco, Dallas and Atlanta, and offices in Philadelphia and St. Louis. These warehouses were staffed with qualified printing technicians, under whose supervision contracts were let, paper was stocked and delivered as needed and delivery of finished work was made. Operation of the warehouses marked the first decentralization of government printing in history. Without these branch offices it would have been impossible for the public printer to furnish the huge quantities of books, pamphlets, forms, etc. needed to carry on the war. The warehouses, however, had been merely a temporary expedient to assist in doing a job that had to be done. They were closed as soon as the emergency was over.

On July 1, 1946, the government printing office was further expanded when it absorbed 15 field reproduction (offset) plants, previously operated by the procurement division of the treasury department, in Philadelphia, New York city, Boston, Chicago, Cincinnati, Cleveland, Kansas City, Denver, Seattle, San Francisco, Los Angeles, Fort Worth, Dallas, Atlanta and Washington, D.C. Employees of these government plants, engaged exclusively in producing public printing, were appointed under the civil service system, like the employees in the government printing office in Washington. Even after the successful conclusion of World War II, printing demands remained so heavy that it appeared in the best interest of the government to retain the field establishments but to consolidate them with the Washington printing office for greater efficiency and economy of management.

During the 10-year period 1937-46 inclusive, the government printing office produced 108,078,053,121 copies of finished work, ranging from simple forms to large bound volumes, valued at \$376,534,249.16. Appropriations in the amount of \$37,365,000 were made to the office to cover the cost of work for congress. All printing except congressional documents was sold to governmental departments and agencies and paid for out of funds appropriated to them specifically and exclusively for printing and binding. Work was billed to the departments at cost, including overhead. If any surplus remained at the end of the year through sales receipts in excess of actual production costs of the publications, it was turned in to the treasury.

In addition to manufacturing public documents, the government printing office also sells and distributes them. The superintendent of documents, an official of the office, is authorized by law to sell at cost to the public any document whose distribution is not otherwise specifically directed. He may order to be printed a quantity of any official publication which may, in his opinion, have a sales value. As the ordering department has already met the preparatory charges, the superintendent of documents pays only for presswork, paper and binding. His sales price rep-

resents this cost, plus 50% for handling. Under this arrangement he carried on a public sale business of \$2,180,476 in the 1945 fiscal year, selling 37,085,361 copies of documents. This business provided a profit of \$1,300,483, which was returned to the treasury. The documents division is also designated by law as the distributing officer for both departmental and congressional publications.

(A. E. GI.)

Priorities and Allocations

See BUSINESS REVIEW; LAW; WAR PRODUCTION.

Prisoners of War

World War II provided the first test of an internationally-agreed-upon code for the treatment of prisoners of war. In 1929, 47 governments assembled at Geneva, Switzerland, at the call of the Swiss government, signed an agreement entitled, "Convention of July 27, 1929, Relative to the Treatment of Prisoners of War," the first codification of international law concerned solely with the treatment of prisoners of war. The necessity for such a convention had been demonstrated during World War I, when bilateral and multilateral agreements had to be worked out among the belligerents in the course of hostilities. So difficult and time-consuming were negotiations under such conditions that the agreement between Germany and the United States for the treatment of prisoners of war during World War I was not ratified until a few hours before the Armistice.

In general, the 1929 convention provided minimum standards for the treatment of prisoners of war. Food was to be equal to that of troops of the detaining power at base camps. Sanitary and medical facilities were to be provided. Prisoners might be held in compounds but not individually confined except under unusual circumstances. Officers received pay, generally on the same scale as officers of corresponding rank in the army of the detaining power. Prisoners other than officers might be required to work with pay at an agreed-upon rate, but the work could have no direct relation with war operations. Representatives of the protecting power might visit camps. Facilities for the exchange of correspondence with relatives at home were to be provided, and prisoners were allowed to receive parcels. Such correspondence and parcels were exempt from all postage and customs duties. The convention further provided for the exchange of information about prisoners through bureaus in each of the belligerent countries and a central information bureau.

The 1929 convention was subsequently ratified by 36 of the signatory nations, among them the following major belligerents in World War II: China, France, Germany, Great Britain and the United States. Although representatives of Japan had signed the convention, the Japanese government failed to ratify it. In Jan. 1942, Japan agreed to abide by the terms of the 1929 convention, qualifying that statement by the expression, *mutatis mutandis*, but this action was not formal ratification. The nations not signatory to the convention were given an opportunity to adhere to it, and six of them subsequently announced their adherence. The U.S.S.R. did not participate in the 1929 meeting at which the convention was signed and did not subsequently adhere to it. Following the outbreak of hostilities with Germany in 1941, the soviet union stated that it would apply the terms of the Hague convention of 1907, which had no provision for neutral observation of prison camps, the current exchange of names of prisoners or for correspondence with prisoners.

Treatment of Prisoners in World War II.—In general,

the treatment accorded to recognized prisoners of war in permanent camps during World War II was considered to have been superior to the treatment of prisoners in World War I. In some cases they were reported to have fared better than the civilian population of the holding nation. Reports of neutral delegates of the protecting powers and of the International Red Cross committee which visited such recognized camps in nearly all belligerent countries indicated that the detaining powers were endeavouring to observe the terms of the prisoners of war convention.

There were incidents of abuse of prisoners of war and of failure to provide the facilities required by the convention, usually occurring in the period immediately following capture and while in the custody of combat troops. Facilities for adequately handling large numbers of prisoners were usually nonexistent in forward areas. In general, however, after establishment in regular prisoners of war camps remote from the front, prisoners held by countries bound by the convention were not mistreated. Standards of care varied with the customs of the detaining powers, local conditions and supply shortages in the country of detention.

Lack of transportation from the fighting areas to permanent camps was a cause of occasional brutality. The "death march" to the camp at Tarlac of U.S. prisoners captured at Bataan and Corregidor in April 1942 was one of the worst examples of mistreatment during the war. In weakened condition after the long fight, without adequate food or medicine, the men were marched 80 mi. without food, water or medical attention. Forced marches also occurred in Europe as the Allied forces advanced into Germany from both the east and the west. In an effort to retain the prisoners, camps were hurriedly moved by the Germans. Because of lack of transport, the men made the moves on foot. Many of the transfers were made in winter weather with scanty food supplies. One group from Stalag 64 in Poland marched westward 400 mi. before liberation. The marching columns were, however, frequently met by trucks operated by the International Red Cross committee, and food parcels and other supplies were distributed to the men en route.

British and U.S. prisoners held by Germany fared better than did those of other Allied nations in German camps. The terms of the convention were more strictly observed in their behalf, and in addition they received regularly food parcels, clothing, medical supplies and recreational, educational and religious articles from home. Evidence of satisfactory treatment was confirmed in 1945 after the liberation of U.S. prisoners in Germany when, aside from normal mortality, 98% of the captured U.S. military personnel were taken home.

No information was available from the soviet union regarding axis prisoners held by that country, but axis prisoners held by the other Allies were satisfactorily treated. Most of those captured by the various forces of the British empire were held in Canada. The United States transferred to its continental territory the majority of the prisoners taken by U.S. forces. Neutral observers reported excellent conditions for these prisoners. Such supplementary relief supplies as were directed to them from home were distributed to the prisoners under the supervision of delegates of the International Red Cross committee. Civilian groups in both Canada and the United States occasionally objected to the high standard of treatment given the prisoners. Similar objections by civilian

groups were reported to have occurred in Germany and Japan.

Numbers.—Over-all statistics on the number of prisoners held during World War II were difficult to obtain or verify. The U.S.S.R. did not report its captives. In retaliation, Germany furnished no information concerning soviet prisoners. Japan reported only a small number of those known to be held. Persons originally classified as prisoners of war were later given some other status; for example, Germany was originally reported to have 1,800,000 French prisoners of war but in time many of them were classified as civilian labourers. Yugoslavs and Poles taken by Germany as prisoners of war were similarly reclassified following the flight of their governments after the defeat of their armies. The large numbers of Germans and Japanese who capitulated to the Allies at the end of the war were not usually counted as prisoners of war but rather as "disarmed military personnel."

The number of members of the armed forces of the belligerent countries held as prisoners of war during World War II was estimated at approximately 8,000,000. The two largest groups were not officially reported; they consisted of approximately 2,000,000 soviet prisoners taken by Germany and a similar number of axis troops taken by the U.S.S.R. Of the remaining groups, the largest was the French held by Germany, ranging downward from 1,800,000 in 1940 to 750,000 in 1945. Italians were held by both axis and Allied powers during the war; in 1945 the Germans held 550,000 while the Allies had 428,000.

Substantial numbers of British and U.S. men were held in Europe and the far east. Of the total of 308,000 British (United Kingdom and empire) prisoners in 1945, 200,000 were in camps in Germany and 108,000 were in the hands of the Japanese. At the same time, Germany held 95,000 U.S. military personnel and Japan had 15,000 U.S. prisoners of war in scattered camps in the far east.

Repatriation.—During the course of hostilities, only prisoners of war certified as seriously ill or seriously wounded were eligible for repatriation under the conditions of the prisoners of war convention. Mixed medical commissions accepted by the belligerent governments certified men eligible for repatriation. Repatriates were not to resume active military service. For the most part those repatriated were amputees.

Arrangements for the exchange of prisoners were extremely difficult to complete. The first exchange of U.S. prisoners of war took place at Lisbon, Portugal, in March 1944, when 35 former U.S. prisoners boarded the exchange ship "Gripsholm" en route to the United States. Although the "Gripsholm," under charter by the U.S. government, made a number of exchange trips to the far east and Europe, its passengers consisted principally of diplomatic representatives, or persons accorded diplomatic status, and civilians for whom special arrangements were made by the governments concerned. Only occasionally did the ship carry repatriated prisoners of war on its exchange voyages.

Very few Allied prisoners were liberated in the campaigns in North Africa and Italy. It was not until Rumania was forced to surrender in Sept. 1944 that any substantial number of Allied prisoners were freed by conquest. Consisting principally of U.S. fliers forced down in raids over eastern Europe, the group included 1,200 U.S. prisoners who were quickly repatriated by air.

The invasion of Luzon in the Philippine campaign early in 1945 brought dramatic liberation to 1,150 U.S. prison-

ers of war as well as to 6,600 civilian internees of various nationalities, mostly U.S. Swift thrusts by tank units deep into Japanese territory liberated prisoners at Cabanatuan and at Santo Tomas in Manila, and an amphibious operation at Los Banos rescued 2,200 internees.

Not until the surrender of Japan in Aug. 1945 were any large groups of Allied prisoners liberated in the far east. Remote camps were reached by air and relief supplies, comfort articles, medicines and messages from home delivered. Repatriation was rapidly arranged for all Allied prisoners in Japanese hands, some coming out through the Philippines and Okinawa; others were transported through China and India. This followed the pattern of speedy repatriation carried out in May and June 1945 for Allied prisoners liberated by the surrender in Germany.

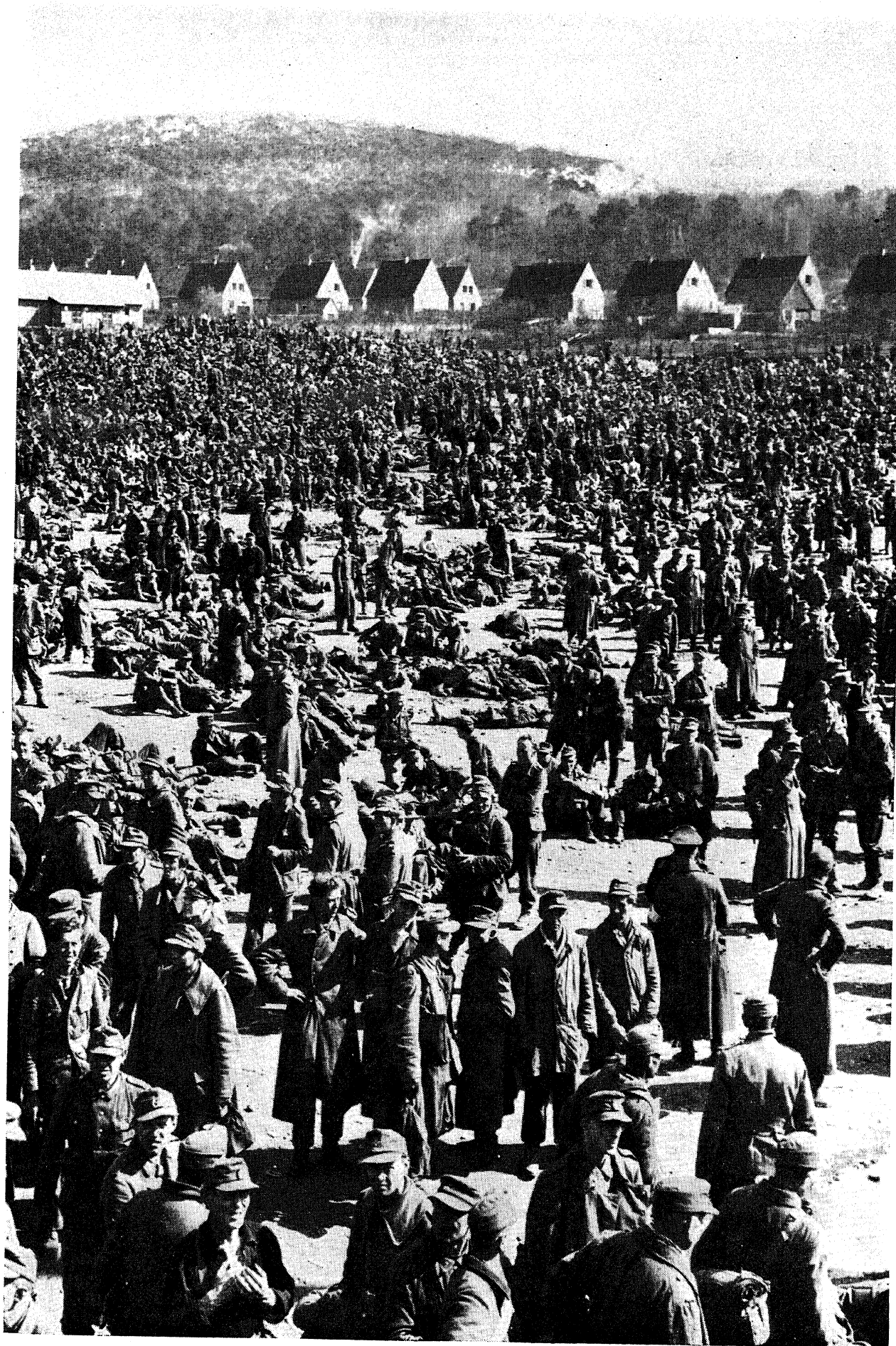
The repatriation of axis prisoners in Allied hands at the end of the war proceeded slowly. By July 1946 all German and Italian prisoners had been transferred from the United States to Europe; the Italians had been released in Italy, some of the Germans released in Germany, others retained in labour battalions under Allied control. All of the Japanese military personnel taken by the U.S. forces were scheduled for repatriation by the end of 1946. No information was available regarding the release or transfer of axis prisoners in the custody of the U.S.S.R.

Repatriation was not required by the prisoners of war convention until the signing of peace treaties, but these treaties were still in negotiation at the close of 1946, more than a year after the cessation of hostilities. Discussions among the Allied powers were in process regarding the retention of prisoners for labour and reparation payments for specified periods beyond the signing of peace treaties but no formal agreement had been reached. During 1946, the Vatican and the Red Cross appealed to the Allied authorities to speed the repatriation of axis prisoners, but near the end of 1946 it was estimated that approximately 1,500,000 axis military personnel were still in captivity, not including an unknown number of prisoners still held by the soviet union.

The Red Cross.—In Sept. 1939 the International Red Cross committee—a self-perpetuating group of 25 Swiss citizens originally organized in 1863 and accorded special privileges as a benevolent intermediary—offered its services to the warring nations and subsequently to other nations as they were drawn into the conflict. With respect to prisoners of war, these facilities included: (1) the services of the central agency for prisoners of war; (2) the maintenance of International Red Cross committee delegations in belligerent countries; (3) the services of the relief bureau for the handling of relief shipments.

The central agency for prisoners of war was established at Geneva by the international committee as provided in the prisoners of war convention. In co-operation with information bureaus in the belligerent states, lists of prisoners were transmitted through the central agency at Geneva on behalf of most of the belligerents. They were handled both by mail and by cable. A card index was maintained of all reported prisoners and civilian internees who were accorded the status of prisoners of war. The agency recorded all changes in the status of prisoners as reported by governments, the committee's delegates in belligerent areas or by the prisoners themselves. The agency also handled inquiries about the location, health and welfare of

Some of the thousands of German soldiers taken prisoner following the collapse of German resistance in the Saar and Palatinate areas early in 1945



prisoners and arranged for the transmission of messages and documents for prisoners. At the end of the war the central agency's master file of cards of information about prisoners of war and civilian internees contained 35,000,000 cards.

The committee maintained delegations in all the belligerent countries (except the U.S.S.R.) and in certain neutral countries, such as Portugal and Sweden, through which goods for prisoners were shipped. The delegates in belligerent countries made regular inspections of prison camps, reported on conditions in the camps, endeavoured to meet the requests of the prisoners, made representations to the detaining powers, purchased locally necessary supplies, arranged for the distribution of food, clothing, medical supplies and other items sent from home for the prisoners, handled inquiries about and messages to and from prisoners, assisted in arrangements for exchanges and generally served as protectors of the interests of prisoners. Their reports were transmitted through the committee to the governments of the prisoners. No delegates were maintained in the U.S.S.R. Japan permitted delegations in Japan proper, in Shanghai and Hong Kong, although they were more limited in their activities than were delegations in other parts of the world. In spite of many representations by the committee, Allied governments and Red Cross societies, Japan refused to permit a delegate to function in the Philippines.

The relief bureau of the International Red Cross committee during the war handled over 300,000 tons of relief supplies for prisoners of war, the major part of which consisted of supplies furnished through the British Empire Red Cross organizations and the American Red Cross for Allied prisoners of war in Europe.

Supplementary Relief Supplies.—The prisoners of war convention permitted prisoners to receive parcels by mail, but these facilities proved inadequate to assure sufficient and equitable supplementation of materials furnished by the detaining powers. The British Red Cross, in co-operation with the Red Cross societies of the British empire, inaugurated in 1941 the system of standard food parcels and clothing sent in bulk for distribution to their prisoners in Germany. In contrast to the earlier system of addressing parcels to specified individuals, these supplies

were shipped undesignated by name. This pattern was followed by the American Red Cross in serving as the agent of the U.S. government to supply extra food and clothing to U.S. prisoners and as the agent of Allied governments and relief societies in supplying relief to other Allied prisoners. Parcels addressed to individual prisoners as contemplated by the convention were also permitted, but their dispatch was limited in number by government regulations permitting only the prisoner's officially listed next of kin to send parcels at specified periods. These parcels were forwarded through normal postal facilities.

Bulk shipments of relief supplies destined for prisoners in Europe were usually received at Marseilles during World War II. They were transported free over French and Swiss railroads to Switzerland and were then dispatched, again by free transport over German railroads, to specified camps. In the last year of the war, when the route through Marseilles became uncertain because of military activities in that area, Goeteborg, Sweden, became a transfer point for large quantities of relief supplies. Up to the very last days of the war, neutral vessels carried supplies into the German port of Lubeck, where representatives of the international committee received the goods and arranged for shipment to camps in the northern part of the German-controlled territory.

Anticipating the collapse of German rail transport in the final months of the war, the Allied Red Cross societies in co-operation with their governments supplied more than 450 large trucks and trailers to carry relief supplies to prison camps in Germany. These vehicles, painted white and bearing large Red Cross and Swiss emblems, criss-crossed Germany in the last days of the war, reaching camps isolated by the breakdown of normal transport, meeting columns of marching prisoners as they were moved before the advancing armies and bringing necessary food and medicines to prisoners of war.

Delivery in the camps was made to one of the prisoners known as the "man of confidence" or "spokesman." In enlisted men's camps he was chosen by the men; in officers' camps he was the senior officer. A general receipt signed by him was returned to the international committee, and the distribution to the prisoners was subsequently confirmed by individual receipts signed by the prisoners receiving the goods. The American Red Cross reported that in 1943 the record of delivery of goods consigned to Americans in prison camps in Europe showed receipt of 99.93% of the goods shipped. Delivery in 1944 and 1945 was somewhat less effective, occasioned in part by losses resulting from Allied air attacks on transportation points in Germany and general disruption in a country approaching military defeat.

Shipments to the far east were much more irregular and difficult. The Japanese refused to permit Allied or neutral vessels to enter the waters controlled by them in spite of many proposals of governments and Red Cross organizations. Cargo space on diplomatic exchange ships was used but only relatively small quantities could be transported in that way, since there were only two exchanges, one at Lourenço Marques in 1942 and one at Goa, in 1943.

Supplies from the British, Canadian, South African and American Red Cross organizations carried on the vessels engaged in these transfers were delivered to Allied prisoners in the far east through delegates of the International Red Cross committee, except in the Philippines, where delivery to prisoners of war and civilian internees was carried out by the Japanese army.

In 1943 the Japanese indicated that they would consider accepting relief supplies delivered through the ter-

Japanese prisoners of war at a camp on Guam listened silently to the announcement of Japan's unconditional surrender in Aug. 1945





German prisoners captured by the Red army, bearing out by their appearance of deadly fatigue their dread of the Russian front

ritory of the U.S.S.R. Soviet vessels carried to Vladivostok more than 3,000 tons of relief supplies furnished through the American and Canadian Red Cross societies. The Japanese arranged to pick up half of these supplies. The remainder was still in Vladivostok when the war in the Pacific ended.

Occasional shipments of food, clothing and comfort articles were made from Germany to German prisoners held in the United States and Canada. Although the Japanese in 1942 sent some tea for distribution to their civilian internees in the United States and Canada, they sent no relief supplies for their captured military personnel and did not inquire about their welfare.

The bulk of supplies delivered to prisoners was in the form of food and clothing, but books, games, sports, theatrical equipment and religious articles were also delivered. The Young Men's Christian association and the National Catholic Welfare conference were particularly active in furnishing such supplies from the United States. Delegates of the Y.M.C.A. were permitted to visit prison camps in many of the belligerent countries and arrange for assistance in educational, recreational and religious activities. Correspondence courses organized by the Y.M.C.A. and other organizations permitted prisoners to continue their education while in confinement. Extensive libraries were built up in many prison camps. In a number of camps the prisoners were permitted to publish camp newspapers.

In Aug. 1946 the International Red Cross committee took the first step toward applying the lessons of World War II to the revision of the prisoners of war convention. A meeting of representatives of national Red Cross societies convoked in Geneva reviewed the experience of the war and prepared and discussed recommended changes. This was to be followed in early 1947 by a meeting of government representatives to consider revisions. (See also DISPLACED PERSONS; FEDERAL BUREAU OF INVESTIGATION; INTERNATIONAL LAW; RED CROSS.)

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Prisons

There were few innovations in prisons throughout the United States between 1937 and 1946. Nevertheless, it was

a progressive era because effective techniques for rehabilitating offenders were more widely utilized, and ineffective ones were discarded.

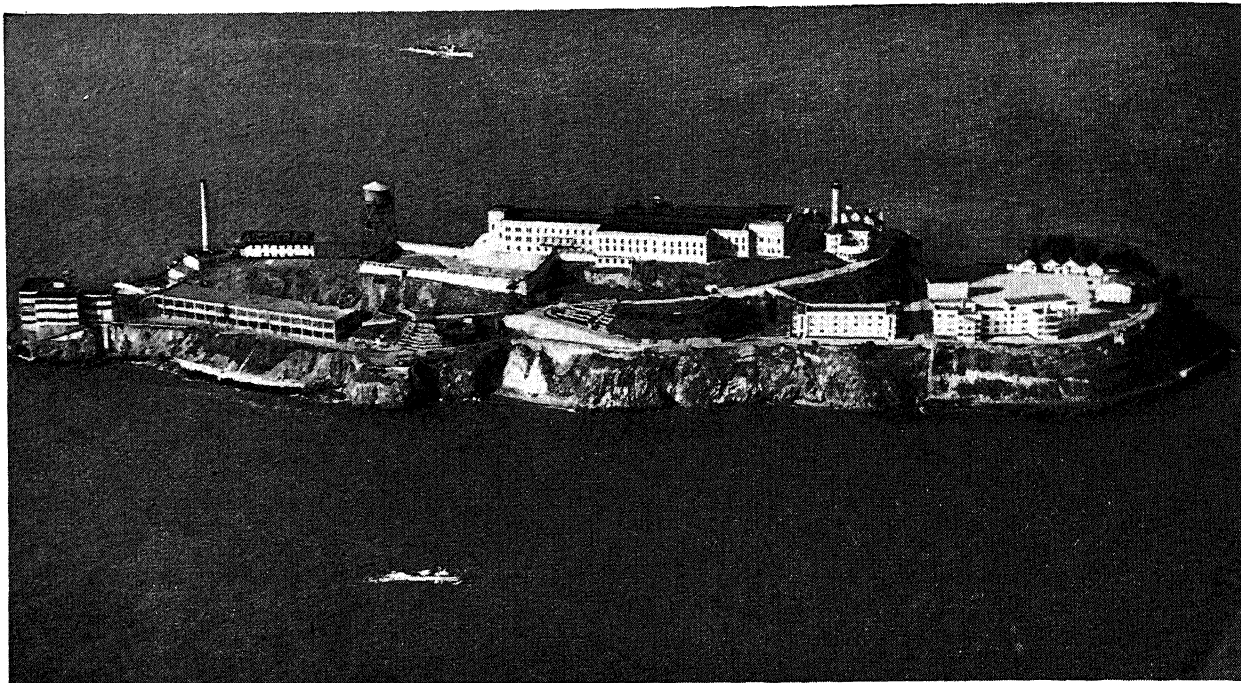
Georgia eliminated the chain gang and striped suit, and Rhode Island the dungeon used to discipline intractable inmates in the state prison. The dungeon consisted of an ordinary cell, with a solid wooden door covering the usual grill door. Prisoners confined there were fed entirely on bread and water and given a regular meal only once every five days.

At the Wisconsin state prison, the silent system, a relic of antiquated penal practices, was at last abolished and inmates were permitted to converse with one another. They were also permitted to smoke cigarettes. (Previously they could smoke only pipes.) For years, any outsider had the right to be taken through the prison upon payment of a 25-cent admission fee. That practice was discontinued in 1940 and visits were restricted.

In a number of prisons, ear phones were placed in each cell so that inmates could hear the radio programs transmitted from a master unit within the walls. Motion pictures also began to be exhibited, and outside lecturers were allowed to address inmates. The value of all this could not be overestimated. Allowing inmates to keep pace with world events through broadcasts and other media prevented them from deteriorating mentally and losing contact with the community to which most of them would eventually return.

At least ten states, following the example set by others in previous years, started to classify and segregate various types of offenders. The opening of farms and road camps allowed for the transfer of prisoners most likely to reform to places where they could live a more normal existence than within prison walls. In the classification, inmates were thoroughly examined upon their arrival at an institution and then subjected to the type of correctional treatment which could best effect their rehabilitation.

In 1938 the United States government adopted the most extensive prison-construction program ever undertaken. By 1940 new institutions were opened in Indiana, Colorado, Connecticut and Texas, and road camps were established in other sections of the country. This program was necessary to relieve the congestion resulting from the enactment of new federal statutes, the imposition of longer sentences and the sharp reduction of parole releases, all of which had added substantially to the inmate population. Similar conditions likewise forced some states, like Missouri and Tennessee, to build new penal institutions. The bulk of the construction was completed before 1940, when building materials were available. However, in 1941, and during the period of World War II, there was a sharp reduction



in crime. Many of the institutions were not filled to the extent that officials expected they would be.

In 1941 Maryland opened a new prison and farm for women, thereby eliminating the practice, long condemned, of incarcerating female offenders in separate wings of male institutions.

Prior to 1941 idleness was rampant in many prisons. But in that year, inmates began to manufacture matériel for the armed forces. As a result, idleness, the most deteriorating aspect of penal life, was practically eliminated. In fact, in some prisons, the inmates worked on two to four shifts, and in all instances patriotism rather than compulsion was the motivating factor. All told, inmates of state and federal prisons produced a total of almost \$125,000,000 worth of matériel during the period of World War II, including steel navy pontoons, submarine and cargo nets, uniforms, blankets, mattress covers, parachute cords, packing boxes for ammunition, rifles, stretchers, shirts, barrage balloons, camouflage netting and ropes of all kind. Penal farms also contributed a considerable amount of food (meats, vegetables and fruits). In recognition of these services, which also included laundry work and salvage and repair service for near-by army camps, many prisons received national service certificates, comparable with the army and navy "E" awards. Furthermore, thousands of inmates gave blood to the Red Cross blood banks and some acted as "guinea pigs" for the cause of science (e.g., at the New Jersey state prison, 201 inmates were used to develop a vaccine for sandfly fever; at the Atlanta federal penitentiary, about 200 inmates participated in a malaria control experiment). Prisoners also purchased more than \$3,000,000 worth of war bonds from their paltry earnings in prison industries.

With the termination of World War II, the matter of penal industries became an important problem for penal administrators. With war matériel no longer required, the question arose: "What can inmates now produce?" The improvement in institutional morale when inmates were kept busy demonstrated conclusively that idleness could not be tolerated if those confined were to be rehabilitated. Consequently, efforts were redoubled to place penal industries on a firm peacetime foundation. The most practical

Alcatraz prison in San Francisco bay, where 16 convicts attempted a jailbreak on May 2, 1946. San Francisco police and coast guard patrol boats are shown nearing the "fortress" after the warden's call for help to suppress rioting

way to create inmate jobs was to have institutions produce food, clothing and other articles for state institutions (e.g., hospitals, asylums, etc.) under what became known as the state-use system. An exchange of products between states was also advocated.

During the period 1937-46, many prisons also inaugurated sound educational programs. There were increased budgets for teachers, libraries and, particularly, vocational instruction, so essential to equip inmates with some means of earning a livelihood upon their release. Of particular interest was the discarding, in some institutions, of the old formal method of teaching and the adoption of the project method used in modern schools. This meant giving the student a graded series of tasks and promoting him as rapidly as he finished each one.

The federal government, as well as some states, opened training schools for guards. Usually the course lasted about four weeks; during that period they were given instruction in criminology and taught how to deal with inmates, with a view toward effecting the reclamation of the latter.

The problem of obtaining employment for prisoners upon their release had always been a vexing one. Private enterprise was reluctant to give them jobs, and even the state governments placed various barriers in their paths. For instance, it was often impossible for released offenders to obtain chauffeur's or plumber's licences. And prior to World War II, they were not permitted to join the armed forces. However, after Pearl Harbor, the army rescinded its previous ruling. To facilitate the induction of inmates who had completed their sentences, Selective Service boards were set up in all federal and state prisons. But not all released felons were inducted. Those convicted of the more serious crimes, as well as alcoholics, sex perverts, drug addicts and habitual offenders, were barred. Some states (e.g., Kentucky, Oklahoma, Texas, New Jersey and Michigan) enacted legislation permitting the parole of worthy inmates, prior to the expiration of their sentences, if the army would accept them. Many of those allowed to "join the colours" distinguished themselves. Some were

decorated for bravery; others were killed in action. But, most important, only a handful of former inmates reverted to crime. Because of this excellent record, it was hoped that both industry and government would be more liberal in giving jobs to former offenders.

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(L. E. L.)

Typical cell-block tier in the prison opened at Green Haven, N.Y., Oct. 1, 1941, to relieve overcrowding at Sing Sing and other "maximum security" prisons of New York state



Great Britain.—The years 1937–39 saw no significant changes in the development of the prison system of Great Britain, *i.e.*, the systems of England and Wales, and that of Scotland, separately administered. Seen in retrospect they marked the close of the second phase of the modern system, deriving from the directive of the Gladstone committee of 1895 that the treatment of prisoners "should be effectually designed to . . . turn them out of prison better men and women, both physically and morally, than when they came in."

The years before World War I had been spent mainly in clearing the ground, by legislation designed to keep out of prison all who could and should be treated by other means; *e.g.*, those who would respond to probation, mental defectives and children; and especially by the provision of the Borstal system of educative training for young people under 21. A striking reduction in the prison population followed the provision of 1914 requiring courts to allow time for the payment of fines. In the three years before World War I, the daily average population in the prisons and Borstals of England, Scotland and Wales was more than 20,000; in the three years 1937–39 it was under 12,000.

In the years between the wars the framework of the new structure became clear. All prisoners were employed in association on useful work for not less than seven hours a day. An evening educational program was provided, mainly by volunteer teachers from the outside community, with lectures and concerts of good music, and the community was also brought into touch with the prisoners through unofficial visitors, who came for friendly talks with the prisoners in their cells about matters of general and personal interest. Methods of classification were carefully studied and applied, and a significant advance was made by the opening of Wakefield prison as a training centre for selected prisoners: there the conditions were more open, the prisoners more trusted, the employments more skilled, the educational facilities wider: finally, the men might complete their training in an open farm-camp.

By 1937 these methods were proved: the time had come for further progress. For this, the Criminal Justice bill of 1938 was to prepare the way: its main provisions affecting the prison and Borstal systems were designed to restrict and eventually abolish the imprisonment of persons under 21 and to provide other methods of dealing with them; to improve the Borstal system; to provide more effective treatment for habitual criminals and to remove such out-of-date forms of sentence as "penal servitude" and "imprisonment with hard labour." World War II suspended this bill and also, for some years, further progress in prison and Borstal development.

On Sept. 1, 1939, war plans were put into force: to clear establishments in vulnerable areas more than 5,000 prisoners and Borstal inmates were at once discharged, and more than 2,000 transferred. In the course of World War II, 17 establishments sustained major damage, and 9 minor damage, from air attack. Fortunately, because of the strength of the buildings, the fine conduct of the staff and the excellent response of the prisoners, casualties were slight except at two establishments, and only one prison had to be temporarily evacuated. Other unfortunate effects of war were the serious loss of staff for national service, the virtual suspension of the educational program and the loss of many unofficial visitors.

On the other hand, the effect on the employment of prisoners was wholly beneficial. A wide range of skilled and semiskilled work was undertaken for the government,

often by novel methods; e.g., articles were made for government contractors under the technical supervision of the contractors' staff, and ordnance stores were packed for D-day under the supervision of the royal army ordnance corps. Shops were tooled and geared for high production. Prisoners worked outside the prisons, on farms or in timberyards, with only token supervision: in 1944 a daily average of more than 900 were so employed. Much work was also done for the forces in preparing trenches, roads, gun sites, etc. In all, the prisons of Great Britain made full contribution to national production and defense.

The trends of prison population during the war years were unexpected. In 1914-18 this population had fallen sharply to about 10,000, climbing slowly again to about 11,500 in 1938; but during World War II it rose quickly to more than 13,000 in 1942, more than 15,000 in 1944 and in 1946 passed 17,000. In the absence of the *Criminal Statistics* these figures cannot be related to the incidence of crime, but certain factors are interesting. In England and Wales the female prison population increased from about 700 in 1938 to about 1,460 in 1944, and that of courts martial prisoners from about 100 in 1938 to nearly 1,000 in 1944: both these factors, explicable by war conditions, were already decreasing in 1946. Available evidence suggests that the increase in the male criminal population was rather the result of longer sentences than of larger numbers of prisoners received.

From 1944 a steep increase in Borstal committals began, raising the population, which had been about 2,500 in 1938, to about 3,500 in 1946. These increases led to much overcrowding, which, combined with understaffing, created difficult conditions for both administration and staff. The end of hostilities, with the return of staff from the forces and the reopening of recruitment, made it possible to plan for taking over additional accommodation, and in England and Wales during 1946 three closed prisons were reopened, and a former U.S. hospital was taken over as an open prison for long-sentence prisoners of "first-timer" type. Various camps and country houses were also acquired for boys' Borstals, of which 6 new ones were opened, together with an additional Borstal reception centre, while 2 country houses were taken as Borstals for 50-60 girls, to be run as small homelike units on new principles.

In Scotland, a new Borstal of the open type was set up in 1946 for 30-40 selected boys working mainly at market gardening and arrangements were in hand for a similar institution with forestry as the main occupation. In both countries, the existing tendency was to concentrate, in the training of young people, on close personal contact in small units with a highly selected staff. At the girls' Borstal in Scotland selected girls were sent out to local employment before release, and the extension of this practice, with the acquisition of a hostel for the girls, was under consideration.

In England and Wales plans for extending the training system for adults were prepared in 1945, the intention being to open three more training centres so as to cover the whole country on a regional basis, but to admit not only first-timers but also men with two or even more convictions who still offered hope of reform. In the impossibility of building suitable premises for some years, Maidstone prison in Kent was converted as one centre, and camps or country houses were being sought for two others. A country house was also acquired, and another was being sought, to enable the application of the principle to women.

Significant developments of detail in the training of prisoners during the period under review included permission to converse at exercise, taking of meals in association, the general introduction of small cash earnings for satisfactory work and, at many establishments, the taking over of management of education and the library by the county or city authorities.

These administrative steps, with the announcement by the home secretary of his intention to reintroduce as soon as possible an amended version of the Criminal Justice bill, may be said to have opened the way to the third stage of the progressive development of the penal system of Great Britain. (L. W. F.)

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France.—In 1944 the provisional government of France sent a special commission to Guiana to supervise the liquidation of the penitentiaries there. It was ascertained that there were about 14,000 inmates confined in the institutions and about 600 *relégués* (men who had completed their terms and were living in Guiana). The commission obtained pardons for inmates who had served 15 years, and exoneration for the *relégués* who were later granted permission to return to France. By 1946, 899 prisoners were liberated, and the penitentiaries in Cayenne and the Island of Salut were closed. The penitentiary in Saint Laurent was still used to house some inmates, because lack of transportation facilities prevented their being returned to France for incarceration in institutions there. Some of the *relégués* would remain because they were too ill to leave, although the French government was providing excellent medical care for them. (See also CHILD WELFARE; CRIME.) (L. E. L.)

Private Schools

See EDUCATION.

Prizes

See CHILDREN'S BOOKS; LITERARY PRIZES; NOBEL PRIZES; PULITZER PRIZES.

Production, Industrial

See BUSINESS REVIEW; WAR PRODUCTION.

Production Management, Office of

See WAR AND DEFENSE AGENCIES.

Profits, Company

See BUSINESS REVIEW; TAXATION.

Progressive Education

See EDUCATION

Progressive Party, U. S.

The Wisconsin Progressive party was organized at Fond du Lac, Wis., on May 19, 1934. The name of the new party, its political principles and its leadership were derived from the "progressive" or liberal faction of the Wisconsin Republican party (as opposed to the "stalwart" wing). The party had no connection with the national third parties of 1912 and 1924, which bore the same name, except that it was an offshoot of the same political movement in which the elder Robert M. La Follette exerted

leadership both in Wisconsin and nationally.

On a platform emphasizing the obligations of the government to afford basic economic and social rights to the people with respect to employment, education and social security, the new party had phenomenal success in Wisconsin in 1934 and 1936. Under its banner, Robert M. La Follette Jr. won re-election to the U.S. senate (in the seat to which he had been elected as a Republican in 1925 and 1928, initially to fill the unexpired term of his father). Philip F. La Follette, the younger son of the elder La Follette, was elected as governor of Wisconsin under the same banner in both 1934 and 1936. The Progressive party captured seven out of ten Wisconsin seats in the national house of representatives, in addition to the La Follette senatorship, but never obtained a clear majority over the Republicans and Democrats in the state legislature.

Early in 1938 an attempt was made to organize the party on a national scale, state by state. The N.P.A. (National Progressives of America) was launched at a rally in Madison, Wis., on April 19, 1938, with a program laying stress on public control of money and credit, the right to work, expansion of social security, protection for individual opportunity and safeguards against dictatorship. The efforts were doomed to failure a few months later in the 1938 elections, when a coalition wrested control of the Wisconsin state government from the Progressive party.

Party fortunes continued to ebb when international issues and the war blotted out domestic issues. The Progressives re-elected Sen. La Follette in 1940 and the gubernatorial candidate Orland S. Loomis (who died shortly thereafter before taking office) won his race on the Progressive ticket in 1942, while the rest of the ticket ran far behind. In 1944, the party obtained only 76,000 votes as against more than 600,000 it had polled in Wisconsin in previous years.

At a state-wide conference at Portage, Wis., on March 17, 1946, party delegates voted overwhelmingly to return to the Republican party. Sen. La Follette thereupon ran for the Republican nomination for senator on Aug. 13, 1946, but failed in his bid by 5,600 votes. (See also ELECTIONS; WISCONSIN.)

Propaganda

See PSYCHOLOGICAL WARFARE.

Proportional Representation, U.S.

See CENSUS DATA, U.S.; MUNICIPAL GOVERNMENT.

Proteins

See BIOCHEMISTRY.

Protestant Episcopal Church

For the Episcopal Church, the decade 1937-46 was a period of sustained work and growth in the midst of adverse conditions and events including a long continued financial depression, World War II, and the vast problems and issues of the postwar world. These world conditions deeply affected the thought and life and work of all churches and, overshadowing all other events, the release of atomic power opened a new age and confronted mankind with a choice between world-wide devastation or the establishment of just and lasting peace.

In the midst of this eventful and troubled decade, in 1943, the Episcopal Church reached the highest membership in its history. In that year, the numbers reached 2,188,573 baptized persons, of whom 1,520,394 were communicants. That growth was sustained in later years.

For a number of years previously, up to about 1930, the

growth of the Episcopal Church relative to the total population of the United States had been unfavourably affected by the immense flood of immigrants from continental Europe, none of whom had any Anglican background. When this immigration ceased, however, about 1930, the Episcopal Church at once showed remarkable growth relative to the population. In the decade 1930-40 the increase in the total population was 7.24% and the communicants of the Episcopal Church increased 14%, a growth almost twice the growth of the population.

The United States in the postwar period offered a vast field for Christian evangelization; some 50% of its people still acknowledged no affiliation with any church. For this home missionary work the Episcopal Church was well situated, because it was organized on a national basis, and although still weak in some parts of the United States it was planted and at work in every state and territory. The striking growth of the Episcopal Church was shown by the fact that in 1840 the church had only 19 bishops; in 1940 it had 151 bishops and in 1946 the number was 159. Whereas in 1830 the Episcopal Church had only one communicant to 415 of the total population, in 1941 the ratio had grown to one communicant in every 92 persons in the population.

But the work of the Episcopal Church was not confined to the United States. In the decade 1937-46, in spite of World War II and the conditions resulting from it, there was a remarkable growth in a number of the extra-continental missionary districts of the Episcopal Church—Alaska, Honolulu, the Panama Canal Zone and Puerto Rico. In foreign missions the developments were still more striking, although the war had brought destruction and suffering beyond description in these areas.

In the Philippines, the opportunity for the work of the church was greater and more hopeful than ever before.

In China, in spite of the tragic conditions still continuing, the opportunity was beyond estimate. The anti-foreign feeling which once existed against Americans and Christians had disappeared. This vast field now stood open to the church, as one of the most important of all missionary fields. In prewar Japan, the work of the Episcopal Church, and of all churches, had been seriously hindered and curtailed by the government and seemed, during the war, to have been almost destroyed. After the end of the war, however, the situation was so changed, and the attitude of the people was such, that the outlook for the work of the church in that land seemed to be one of great hope and promise. Both in China and Japan the missionary churches which the Episcopal Church planted and fostered were now entirely independent and self-governing while continuing in full communion and fellowship with the Episcopal Church and the Anglican communion. The epochal events and experiences of the decade 1937-46 and the stupendous postwar problems brought a new and great call to the whole Christian church throughout the world. In the Episcopal Church, this urgent call had three chief effects. It brought a marked stirring of the church's own faith and spiritual earnestness; it deepened and strengthened the sacred spiritual relationship between the Episcopal church and the other churches of the Anglican communion; and it aroused in the Episcopal Church a deepening realization of the need of world-wide Christian reunion, a union not only of Protestants on the one hand or of Catholics on the other but a union of all Christians. (See also ANGLICAN COMMUNION.)

(W. T. M.)

650 Protestantism

See under separate denominations: *see also* CHRISTIAN UNITY; CHURCH MEMBERSHIP; MISSIONS, FOREIGN; RELIGION.

Proton

See PHYSICS.

Provisional International Civil Aviation Organization

See INTERNATIONAL ORGANIZATIONS; UNITED NATIONS.

Proximity Fuse

See MUNITIONS OF WAR; STANDARDS, NATIONAL BUREAU OF.

Prunes

See FRUIT.

Psychiatry

Partly stimulated by World War II, psychiatry moved forward rapidly during the decade from 1937 to 1946. New avenues of approach in psychiatric investigations by means of biochemistry, physiology and pharmacology were opened up in the study of the construction of the individual integrals of all living organisms. Research into biology of the growth and organization responses of the body was contemplated, eventually aimed at detecting defects and disorders at an early stage of development. The study of twins, for instance, furnished many new research problems in heredity, with a direct bearing on psychopathologic conditions. In general, psychiatry attempted to take advantage of the great attainments of research in other fields of medicine. The same problems, however, which held back biologic research in general also eluded the psychiatrist. Although it had been long accepted that the body is composed of cellular units, the actual forces controlling their development and multiplication remained unknown. Only when these processes were understood could the part played by constitution in disease or in behaviour disorders be elucidated.

The chief advances in clinical psychiatry were the development of various "shock" methods of treatment, particularly electric convulsion methods, the growth of electroencephalography, the expansion of studies on the subconscious by means of drugs (narcoanalysis), the integration of the material disclosed by narcosis and the expansion of the field of psychosomatic medicine, bringing out the far-reaching effects of the emotions on bodily function. The gains in psychiatric knowledge were greater in the decade 1937-46 than in any other equal period of time.

Shock Treatments.—When an appropriate amount of insulin was injected intramuscularly, and carbohydrates were restricted in the diet, patients rapidly passed into a state of coma. This condition, called "insulin shock," could be quickly terminated if glucose, a form of sugar, was given by stomach tube or intravenously. During the state of shock, convulsions occurred. Although the effect of the hyperinsulinism on the blood sugar could be measured, the actual cause of the brain changes, leading to coma and convulsions, were undetermined.

It was this grave, and somewhat dangerous, form of therapy that was used in the treatment of the most serious form of mental disease, schizophrenia (dementia praecox). The procedure, introduced in Vienna by Manfred Sakel in 1933, became widely used after that time throughout the

world in the treatment of this disease.

Other methods of creating a condition of shock soon followed the initial efforts of Sakel. Metrazol was the principal drug used, but shock by electric methods was later introduced and made relatively safe. Electric shock, largely because of the ease of administration and control, almost supplanted other forms in the treatment of mental disease, except in the case of schizophrenia.

The results with insulin shock therapy in schizophrenia were evaluated after a period of seven to ten years' trial with this drug. Practically all reports indicated that the percentage of remissions in cases of schizophrenia following insulin treatment was definitely increased. Many patients, previously confined to a hospital, were maintained at home, in greatly improved health. The insulin method appeared to give the best results with schizophrenia. There were, however, a number of contraindications noted to its use, particularly heart disease, tuberculosis and organic diseases of the body. The method was not, moreover, without danger. Prolonged coma was the most serious complication.

The other forms of convulsive therapy were less favourable in the treatment of schizophrenia, but were of use in the therapy of the involutional states, manic depressive psychoses and other depressive reactions. Many organic diseases of the body, however, precluded their use. Fractures, or dislocations, resulting from the often violent convulsions occurred, but the sudden seizures resulting from shock were somewhat controlled by the drug, curare. As electroshock caused a greater and more prolonged memory loss than did metrazol, it was favoured by most psychiatrists. The shocks by electric methods, moreover, were easy to administer and the convulsions were not severe, thus lessening the danger of damage to the body. There was no memory of the treatment by the patients.

The exact nature of the response to all forms of convulsive treatment was not clearly determined. A convulsion appeared to be necessary for effective treatment. About 8 to 20 shocks were given for depressions; 20 to 50 for schizophrenia. In general, psychiatrists were convinced that shock treatments, when properly given by qualified physicians, had become a definite part of therapy. It was possible, however, that only the secondary, presenting features at the periphery of the personality, and not the matrix of the psychosis, were changed by shock therapy.

Psychosurgery.—In the affective forms of mental disease, particularly in the simple depressions, where the symptoms are of an emotional character, with changes in mood, the value of the original work of Egas Moniz on surgical destruction of the association pathways to and from the frontal lobes of the brain was confirmed by many psychiatrists. This radical procedure, called prefrontal lobotomy, requires a bilateral trephine of the skull, followed by a deep cutting of the brain substance, a destructive process without possibility of restoration of function by healing of the wound. The operation was not widely recommended, but in selected individuals, particularly those showing fear, physical and mental agitation, aggressive violence and acute mental suffering, lobotomy was accepted as a valuable method of treatment.

The technique of lobotomy following Moniz was further developed by Walter Freeman and J. W. Watts. The general subject of psychosurgery became widened and the results, after periods of observations lasting years, were evaluated in considerable detail. Most patients showed a relief from anxiety after the operation, and many previously institutionalized were able to live at home.

The psychological changes most frequently noted fol-

lowing lobotomy were a change in personality, with indolence, outspokenness, and a hasty, undiplomatic and often tactless form of speech. Many patients were apologetic when their actions or words were uncontrolled. In general, emotional outbursts were brisk, shallow and short-lived. Brooding, melancholy, hurt feelings and grim silences, frequently the main characteristics of the pre-operative state, tended to disappear. Grudges were no longer harboured. The intellect always remained intact. The operation was found useful, in addition to its value in agitated depressions, in chronic, long-standing cases, especially in patients with a poor prognosis.

The results of prefrontal lobotomy varied considerably with the types of mental disease suffered by the patients. Some selected schizophrenics did well. Those with criminal antisocial tendencies failed to improve. About one-third of all patients operated upon were considered as significantly recovered. The whole subject of psychosurgery was not fully evaluated, for a resurvey of the condition of these patients after a longer period of observation was felt to be needed. The durability of the reported ameliorations and the reaction types most likely to be benefited could only be estimated eight to ten years after operation.

Epilepsy and Electroencephalography.—The convulsive states, particularly the epileptics, were extensively investigated by electroencephalography. Hans Berger of Jena, by the application of electrodes to the scalp, observed electric waves originating in the cerebral cortex. The brain was found to "beat" in a definite rhythm, a fact previously unknown before electronics made possible the detection of minute changes in electric potentials. That these could be recorded from the surface of the head was an observation of prime importance leading to a new evaluation of brain function, both normal and abnormal. The recording apparatus was termed an electroencephalograph and the record an electroencephalogram. The instrument was analogous to the previously developed electrocardiograph, used to detect changes in the electric potentials of the heart.

Electroencephalography was found to be limited in scope, for only the potentials between two points could be recorded by a pair of electrodes. The modern record, however, consisted of a series of waves, usually taken from 8 or 16 areas of brain simultaneously. As millions of nerve cells in the brain "beat" rhythmically, the electroencephalogram made a record of only a few areas at any one time, thus providing a restricted experimental study of cerebral physiological activity. Nevertheless, electroencephalography

greatly advanced the knowledge of brain disease, for characteristic patterns of electric changes were soon observed in epilepsy and in tumours of the brain.

In the cerebral cortex there was found a summation of the action potentials from thousands of cells which build up a rhythm with an average frequency of 8 to 12 per second. These waves were observed to have voltages of 20 to 60 microvolts each. Potentials were amplified a million or more times by the encephalographic apparatus before being recorded by means of an ink-writing oscillographic pen or moving paper. The most frequent wave seen, with a rate of about 10 per second and found in the parieto-occipital cortical areas, was called the "alpha rhythm." A "beta rhythm" of 13 to 32 per second and of lower amplitude was observed in the frontal areas of the brain. Less frequent was the "gamma rhythm," also found in the frontal lobes, of 33 to 35 waves per second. A "delta rhythm" was also disclosed, with waves of 1 to 8 per second. These regular patterns were discovered not to develop in man until the eighth or tenth year of life. Closing the eyes brought out slower and more uniform waves, and even slower waves were observed in sleep. Cerebral rhythmia, however, was remarkably constant in man.

Epileptic seizures of all types were always associated with marked disturbance of the normal rhythm. So pronounced were these changes that the name "paroxysmal cerebral dysrhythmia" was suggested as a synonym for epilepsy. The term was widely accepted, although a few "normal" persons showed some of the changes, possibly resulting from subclinical, but potential, epilepsy in such individuals.

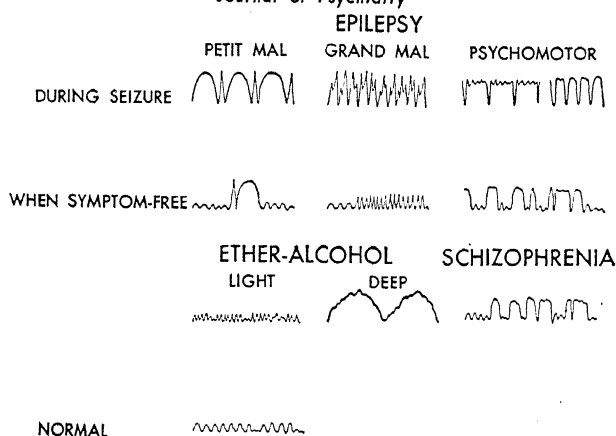
In epilepsy of the grand mal type, it was found that dysrhythmia was most marked, with increased frequency of the waves and a change in their shape. Petit mal showed waves of greatly increased amplitude and variations in shape, with spike and sinusoidal waves alternating. Patients with psychomotor attacks, another variety of epilepsy, had waves in their electroencephalograms of still another pattern. Thus the three types of seizures were found to have distinct cerebral rhythms.

In addition to diagnosis and prognosis in epilepsy, the electroencephalogram proved helpful in determining the value of various methods of treatment, even in some cases when given before the onset of clinical seizures. It was noted that most anticonvulsant drugs slowed the cortical rhythm and they were therefore more effective in grand mal than in other types of epilepsy.

Brain tumours were also found to cause alterations in the electric potentials of the cerebral cortex. When electrodes were placed near the site of a tumour, slow waves of the delta type were observed. When tumours produced localized convulsions, the waves were sharp, with a tendency towards spike formation. The electroencephalogram proved to be an aid, therefore, in localizing tumours before operation.

Psychiatry in the Selection of Army Recruits.—Keeping in mind the heavy toll of psychiatric casualties in World War I and the costly care of the veteran with nervous and mental diseases in all countries following that conflict, there was an attempt in World War II to select men and women for service with the armed forces with greater vigilance than at any time in the history of psychiatry. The problem was quickly recognized both by doctors and line officers, for men mentally unfit for war were a burden to commanders in training camps as well as in the field. An effort therefore was made to "screen out" all recruits with unstable nervous systems, particularly those who had failed

Sample patterns of brain waves in various conditions of mental health and illness, from Gibbs, Gibbs and Lennox in *The American Journal of Psychiatry*



to meet adequately the problems requiring adjustment in ordinary civilian life. The severe alcoholic, the feeble-minded, the frankly psychotic or those individuals with hereditary taints were automatically rejected. Epilepsy and migraine were harder to detect, but they too were considered reasons for elimination when found.

The psychoneurotics presented the greatest problem. Although it had been clearly shown that from one-half to two-thirds of the men who developed neuroses of an incapacitating nature in World War I showed signs of such a disability before induction and that the armed forces had no place for the so-called "problem" boy, many such were not rejected in World War II. Examinations were often hastily conducted, and trained psychiatrists were too few to cope adequately with the rush of recruits at induction centres. There was an attempt made to eliminate the unfit during the training period, but in places where there was official apathy many men were retained in service, only to break down under the great strain of modern mechanized warfare. The decisions, moreover, were not easily made. Some psychiatrists tended to overexaggerate the importance of the unstable man, but, in general, line officers expressed a willingness to acknowledge functional and mental disorders. It was widely recognized that the public and the military officials had learned a good deal about mental illness between 1917 and 1939. Psychiatrists with actual battle experience tended to reject a larger percentage of recruits on neuropsychiatric grounds than did those who had never seen mental casualties under fire.

If unfit men were missed at the induction stage, many were identified at the training camps, provided psychiatric advice was available and an understanding commanding officer was in charge. The sudden change of environment and the strict discipline soon uncovered psychopathic tendencies in the new men, particularly at the time of life, the adolescent period, when character, habits and personality were being moulded. The unstable soldiers tended to become discouraged, showed defense reactions and even resorted to malingering. The chief complaints were the most simple ones—enuresis, hysterical seizures, painful feet and inability to swim. Few showed marked antagonism or engaged in misdemeanours requiring punitive action. These traits were not acquired, but were simply brought out in men with psychopathic constitutions. If such individuals were not promptly eliminated at the training centre a large percentage of them broke down under the stress of war.

Screening was not entirely successful in the U.S. or in other countries. The chief factor in the failure was the urgency in developing great armies quickly. Good psychiatry was found, as in the past, to be based on slow, careful analysis of character, traits and moods. When speed was essential and psychiatric surveys were curtailed, the percentage of unfit men passed was augmented.

Although the technique of war was considerably modified by mechanization in World War II and the reaction pattern of men under stress was in many cases changed in form, the same fundamental conception of faulty emotional stabilization was held as the underlying cause of the psychoneuroses of war, as in civilian life. World War II produced less hysteria and hysterical reactions than did World War I, with more anxiety tension states, but this made little difference in the selection of recruits.

In the U.S. the rejection rate at induction centres in World War II was about 7 to 8 men per 100 examined, a figure that comprised nearly one-third of all rejections for

all causes. A somewhat similar service rendered by psychiatrists during the induction of soldiers for World War I, found about 2 men per 100 with mental unfitness. The final success or failure of the screening method was approximately estimated, by measuring the rejection figures with the discharge rate in the U.S. army for neuropsychiatric disorders. In World War I the total rate was about 0.7 men per 100; in World War II the rate was reduced to approximately 0.4 men per 100. Psychiatrists felt that these results indicated that something was accomplished by the more intensive screening carried out in World War II. Many officers expressed an opinion, however, that if the examinations had been more fully conducted, a larger percentage of nervous breakdowns in the army under battle conditions could have been avoided.

War Neuroses.—Although many types of neuroses were observed in World War II, the separation-anxiety type of depression was the outstanding reaction. The world-wide nature of the conflict, the isolation of many military posts and the long periods of inaction were factors in the development of this special form of neurosis. When group spirit failed, morale became low and the phenomenon of panic in a military unit sometimes affected all members of the group simultaneously. High morale always exercised a profound influence in counteracting the ill effects of dependence on home and family and was a striking aid in supporting emotional stability in soldiers.

On analysis, the anxiety complex of war disclosed the same causes as activated the peacetime emotional disturbances. When a study of complete social histories was made, broken homes, psychosis in the family, faulty education, occupational maladjustment, antisocial behaviour and alcoholism were found. A history of broken homes occurred in nearly one-half of the cases investigated.

The war environment, however, tended to colour the neurosis. During occupation of Guadalcanal by the U.S. marine corps, for instance, sleeping and eating were almost impossible. Rain, heat, insects and malaria contributed to the disordered thinking and living. The strain lasted for many months, and the men lost weight rapidly. Although the hardened soldiers were intellectually normal, some became emotionally unstable and showed marked neuromuscular tension. Fear of cowardice was almost universal. Few such cases, with headaches, lowered thresholds to sharp noises, periods of amnesia and of panic, sensory somatic complaints, muscular loss of tone, tremors and palsies, could be returned to full or combat duty. In spite of such emotional disturbances, most of these men were able after discharge to enter civilian life and take their usual places in society.

In other areas of active combat, similar situations developed. The British found many cases of anxiety neurosis in the attack on Norway. The rapid action of the Libyan campaign, on the other hand, with a better-trained army, caused few nervous breakdowns. The incidence rose in the Tunisian battle and at one time comprised 10% to 15% of all casualties. It was observed, as in other fields of battle, that when the morale of a unit was high and the officer-man relationship was good, there was less tendency for individuals to break down under combat.

Although frank psychoses were rarely encountered in the armed forces, some severe hysterical episodes presented schizophrenic symptoms. The onset was usually explosive, the patients showing panic states with aggressive tendencies, acute depressions with suicidal drives and other marked symptoms. The reactions were often brief and there was a large percentage of recoveries, more frequent than in civil life.

Seasickness was a type of emotional disturbance found particularly in the navies, but not uncommon on troop transports. Two rather definite types were disclosed on examination. One was constitutional, with a uniform history of nausea and vomiting on all moving vehicles such as cars, trains or roller coasters. The senses of smell or of taste, or the sight of blood was sufficient to initiate the attack. Similar symptoms occurred during combat from anxiety and other emotional disturbances. Most patients in this group were neurotic or unstable individuals and efficiency at sea in naval officers was extremely low. No amount of effort towards keeping the officers or men at sea overcame this type of seasickness.

The second type of seasickness was characterized by a lack of nausea and vomiting from emotional situations. Although the symptoms occurred with considerable frequency and often were not entirely curable, most men did well on larger ships or on land duty. In both groups a large percentage of gastrointestinal abnormalities was found, in many cases relieved by surgical operation or medical treatment.

The most valuable prophylactic against nervous breakdown in combat conditions was found to be adequate training in the ground schools and navy establishments and the certainty that all men were fully drilled in the technical skills needed to use the complicated weapons of modern warfare. In well-trained units, only about 2% of the men who broke down had to be evacuated to a base; after a period of rest many returned to some kind of full duty within a few weeks. Medical officers, too, were trained to watch for signs of stress, such as changes in mood or personality, loss of attention, amnesia and restlessness. When men were quickly removed from danger spots under these conditions, many recovered rapidly and completely. Treatment was most efficient when given near the front lines. In general, less than 5% of the mental casualties were discharged from the services because of prolonged or permanent symptoms.

All military psychiatric statistics were evaluated in the light of the military situation. A line was drawn between sickness and well-being, different from that of civil life. Inadequacy, in a military sense, was found to be an all-inclusive term and not, therefore, a fair peacetime estimate of a person's capacities and capabilities. On account of this many men, discharged from the services for reasons of emotional instability or personal inadequacy, adjusted themselves well when back in civilian life.

The use of drugs, given intravenously, to induce a state of narcosis as a means of treating the acute mental reactions in combat troops was used extensively in World War II. When British soldiers were evacuated from Dunkirk, sodium amytal was given by the intravenous drip method to ensure prolonged sleep, sometimes lasting under controlled conditions for days. This form of treatment proved effective for the exhausted soldiers. Feedings were also given by vein. When small doses were dripped in slowly, a condition of narcosis was established, somewhat similar to the dreamy state of hypnotism. Patients, otherwise unable to report their terrifying experiences, frequently were able to do so when narcotized. At this time suggestion and persuasion, important methods of psychotherapy, were found to be more efficient than during the waking state. The same general method of treatment was used extensively by the U.S. Army air forces in the treatment of combat fliers. Sodium pentothal, a similar narcotizing agent, was given intravenously, both as a diagnostic tool and as a means of therapy. Under narcosis, psychiatrists obtained a clear view of the intensity of anxiety, the degree of re-

gression experienced, the strength of the dependent trend and the dynamic relation of these factors to each other. Simple exposure of the conflicts did not always achieve synthesis, for the material revealed was frequently lost when the soldier was aroused from the effect of the pentothal, and no change in his emotionally disturbed state had occurred. The effects were similar to the sodium amytal "interviews" (narcoanalysis), long used in civilian psychiatry. The benefits resulted almost entirely from the knowledge gained by the psychiatrist concerning the patient's concealed difficulties. The next step was the synthesis of the material revealed, the painful or traumatic events, the anxieties and hostilities connected with them, being accepted by the soldier's ego. When accomplished, this process, known as narcosynthesis, enabled the man to live with his conflicts in an economical and realistic fashion and give up the neurotic compromise which had resulted in his symptoms. Narcosynthesis, as developed in World War II, opened up a new and important method of treatment in psychiatry. Its use in civilian life had yet to be fully evaluated at the end of the decade.

Aviation Psychiatry.—Certain mental disturbances peculiar to aviation were noted during World War II. A chronic functional nervous and psychic disorder known as aeroneurosis was characterized by nervous irritability, insomnia, minor psychic trends and gastric distress. Occurring almost exclusively in experienced pilots, it was commonly known as "staleness." A similar condition had long been recognized by professional civilian pilots. On analysis it was seen that emotional stress was the principal exciting factor since, in order to fly, repression of many thoughts, mainly varieties of fear, is necessary. If such repression was not successful, conflicts arose, for the instinct of self-preservation, constantly in mind in aviators, was capable of causing profound emotional disorders. Even when fear was repressed subconsciously, pilots were affected by it every time they went into the air. Flight surgeons were able to detect signs of aeroneurosis quickly, often before the pilot himself was aware that anything was the matter.

"Flying fatigue" was a different syndrome, due to highly abnormal flying strain, as often occurred in combat conditions. The emotional factors noted in aeroneurosis did not appear, but the condition, slow of onset but rapid in development, led to deterioration and disintegration of mental and physical faculties.

Of particular importance in aviation was aeroembolism, a condition produced by rapid decrease of air pressure below one atmosphere. This occurred at altitudes above 12,000 ft. Symptoms came on rapidly, with a decrease in acuteness of hearing and vision, blunting of judgment, impaired critical perception, indolence of thought, forgetfulness and absentmindedness. Changes in mood, a diminution or loss of the will to perform certain duties (although the ability to perform them was essentially unimpaired) were also recorded. Pilots were usually unaware of these symptoms, and disasters were frequent when precautions were not taken. At heights above 18,000 ft., all symptoms were exacerbated. Aeroembolism was caused by bubbles of nitrogen escaping from the blood stream and lodging in various parts of the body, particularly the brain. When an uninterrupted supply of oxygen was given, high-altitude flying above 12,000 ft. was possible, and aeroembolism was abolished. Pilots showed considerable variation in their ability to withstand high altitudes, some requiring little oxygen even above 12,000 ft. The failure of the pilot to

recognize his own condition was the chief cause of accidents. In addition to aeroembolism, damage to the brain from lack of blood supply was caused by the execution of sudden and greatly accelerated dives and turns. Special suits of clothes were devised in an attempt to stabilize blood volumes and prevent loss to the vital brain centres from the effects of centrifugal force.

Civilian Reactions to Air Raids.—During World War II, the extensive bombing of cities gave rise to some mental reactions in the civilian population of a particular nature. In almost no instance was widespread panic observed. Even in the heavy night attacks on London and other large cities, many persons managed to sleep through raids. Inaction, particularly in shelters, during bombing caused considerable nervousness, but trained group leaders were a marked factor in overcoming fear in civilians. Even worse than the air raid itself was the general effect on living conditions, with fatigue, lack of sleep, improper diet, loss of homes and disruption of communications as the chief factors in social disorganization. No psychiatric syndrome developed that could be called an "air-raid neurosis." There was some increase in London hospitals of such disturbances as perforations of gastric ulcers, thought to be on a nervous basis, attended by anxiety, poor diet and increased smoking and drinking. In general, air raids tended to reduce, rather than cause irrational mental attitudes and even made good citizens better. An increase in the war effort was frequently noted in areas most severely raided.

Rehabilitation.—In spite of the large numbers of men rejected for military service or discharged on the basis of neuropsychiatric disability, reorientation into civilian life was not nearly so large a problem as had been anticipated. This was partly based on the fact that the term "psychoneurosis," as used in military centres, did not prove to be entirely justifiable in civilian medical diagnosis. Many patients with fears, anxieties and mild depressions were given a military diagnosis of psychoneurosis. In most cases, these symptoms were of a temporary nature, a maladjustment caused by the war which was readily righted, often without psychiatric help, by a return to normal surroundings.

When psychiatric help was needed, rehabilitation clinics were set up, the best being distinct community ventures in which the local physicians and employers were an integral part. Some farsighted industrialists kept in touch with their employees during the war. Thus, when these men and women returned there was an already established basis of understanding even for individuals who had been rejected or discharged on psychiatric grounds. It was found that the group with battle-incurred disability and those discharged as unfit for service because of slight mental disorders did not prove to be much of a problem in rehabilitation.

Preventive Psychiatry.—In active combat it was found that the danger of being killed or maimed imposed a strain sufficient to be the primary cause of nervous breakdowns. An analysis of battle casualties in the U.S. 5th army showed that 50% of the original strength were either killed, wounded, captured or missing after a combat period of 120 days. The infantry suffered the greatest loss of manpower from psychiatric disorders. Based on the assumption that military psychiatrists at the front were dealing with normal men in abnormal situations, and realizing that mental hygiene education and individual counselling required time and skilled personnel not available during the war, doctors recommended environmental modi-

fication as a method of prevention. When it was found that infantrymen either developed an incapacitating neurosis or else became hypersensitive to shell fire, or so overly cautious and "jittery" that they were ineffective and demoralizing to replacements, a time limit of 120 aggregate days was advised. The worst reactions usually occurred after about 200 combat days. Other recommendations dealt with the sending of replacements up to the front in groups rather than singly, preferably men who had been trained together. Such changes in environment, easily made in war, were less possible in civilian life. It was pointed out, however, that industry appeared to offer a particularly favourable field for this approach to preventive psychiatry. Wages, hours, working conditions, priority rights, promotion, selection and incentive systems were investigated in relation to the mental health of industrial workers. Psychiatrists suggested that environmental changes involving policy and procedure in industry, education, religion and government needed to be studied, with the mental health of the population in mind.

Alcoholism and Drug Addiction.—The subject of alcoholism, its causes and treatment, was extensively investigated by psychiatrists, both in the laboratories and in the clinics. Little evidence was produced to show that the alcoholic is essentially a psychoneurotic. Relatively few persons subjected to severe social and emotional difficulties, and who had a high incidence of other psychoneuroses or even psychoses, became alcoholics. There was a trend in psychiatric thought to consider alcoholism as a part of contemporary culture in that so many social habits develop in response to cultural sanctions. From this standpoint the teetotaler was considered as abnormal as the habitual drinker.

Alcoholism was looked upon as a conditioned reflex, of the type of other reflexes developed by Ivan Petrovich Pavlov and widely accepted as physiologically sound. Treatment based upon the conditioned reflex principle was successfully used in many cases. Drugs of a nauseating type were first given to set up an unconditional reflex of vomiting. The sight, smell or taste of alcoholic beverages served as the conditioned stimulus. When fully developed, a strong and definite aversion to the sight, smell or taste of alcohol in any form was produced. The treatment depended upon co-operation of the patient and prolonged care under controlled conditions in a special hospital.

The subject of alcoholic addiction was greatly advanced by the establishment in 1939 of the *Quarterly Journal of Studies on Alcohol*, and the development of a Research Council on Problems of Alcohol, affiliated with the American Association for the Advancement of Science.

Concerning drug addiction, opinions were confirmed that the steady use of opiate drugs produces virtually no known significant pathological symptoms, aside from the addiction itself; few addicts become moral degenerates and not a few successful, professional and business men are addicted to drugs and take them without signs of mental deterioration for years, provided their supply is adequately controlled by a physician. Marijuana, an extract of the hemp plant, was found to weaken the will, but seldom, if ever, makes the user so weak, as popularly supposed, that he will commit rape, suicide or murder. The drug was found not to be strongly habit-forming. (See also INTOXICATION, ALCOHOLIC; MILITARY MEDICINE; PHYSIOLOGY; PSYCHOLOGY; REHABILITATION OF THE DISABLED.)

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Psychoanalysis

See PSYCHIATRY; PSYCHOLOGY.

Psychological Warfare

Psychological warfare was not a new creation either of modern militarism or of the totalitarian state, any more than the control of men by persuasion, emotion or suggestion was unique to the period of World War II. Genghis Khan, in his great conquests, spread defeatism and divisionism among his enemies through his secret agents before launching his military attacks. What was new, however, was the systematic and thorough-going exploitation of techniques of propaganda and subversion. Psychological warfare in the hands of the nazis was more completely organized, more centrally directed, its techniques more elaborately developed and its functioning better geared to diplomatic and military policy than ever before.

The Nazi Technique.—The nazis came to power in Germany as exponents and practitioners of the art of propaganda. Their seizure of the state was relatively bloodless and could not be represented as the victory of an armed uprising. It was rather the triumph of power politics, the successful use of a show of force, the victory of techniques of mass suggestion. The nazi leaders made no fundamental distinction between the use of propaganda to consolidate political power internally and its use in international psychological warfare. As past masters in its use, they proceeded to pave the way for their armies long before the outbreak of hostilities in 1939.

The nazis distinguished two main strategic objectives of psychological warfare, (1) the winning of converts to the nazi cause and the subsequent sustaining of their faith and (2) the paralysis of organized opposition through the creation of doubt, uncertainty, confusion, suspicion and fear. Perhaps their greatest success outside of Germany was in weakening French national unity and spirit so that France was easily overrun by the wehrmacht.

The assumption fundamental to nazi propaganda-strategy was the belief that the masses of people everywhere were psychologically sick personalities, moved by emotion, irrational hopes, longings, desires and fears. But Goebbels and Hitler were astute enough to realize that man's emotional nature is cloaked by his reasoning process. Hence nazi propaganda, while appealing basically to feeling, was careful to affect a plausible and rational guise. To the non-German, the speeches of Hitler seemed like the rantings of a madman to his mentally deranged henchmen. Careful analysis, however, shows the care and attention the nazi propagandists gave to the appearance of rationality with the primary objective of appealing all the more powerfully to the emotions.

On the emotional side, the nazis assumed that the deep longings of the frustrated German of their generation for material well-being, security, power and prestige were typi-

cal of the masses the world over. The masses, moreover, were feminine in their psychology in that they wished to be led and dominated in attempting to satisfy their aspirations. Nazi propaganda thus had to exemplify the spirit of mastery. It had to be forceful in content and presentation; it should at times employ rough, coarse, harsh language, attack constantly, express the dynamic determination of the nazi leaders, employ the right doses of terrorism, and should occasionally utilize brutality and cruelty. The readiest means of arousing strong, common emotions among frustrated people was through a psychology of hatred. This the nazis sought to do with dramatic recitals of wrongs suffered by the people and the stimulation of aggressive impulses against the wicked and malignant evil-doers. On the positive side it was important to create a fanaticism of faith. Emotions of righteousness had to be attached to the word of the leader and to the simple principles of the nazi creed. Techniques of mass suggestion, constant repetition and slogan thinking were all employed to implement the evoking of deep-lying emotions.

On the rational side, the strategy was to aim for a superficial plausibility to prevent the arousal of true critical thought. An important device for this purpose was the manufacture and manipulation of objective events to accord with propaganda themes. To make the communist threat more real, the nazis had the reichstag building destroyed by fire. When they achieved power, they were able to manipulate foreign policy and domestic affairs to corroborate their verbal claims. Attempts were also made to establish authenticity by quoting from eyewitnesses or by dragging in statements from obscure sources; for example, some unknown Bulgarian newspaper or French journal already under nazi control. The Germans, moreover, sought to make their stories appear reasonable by creating an atmosphere of consistency. This was extremely difficult, because their divisive and dissolvent propaganda was aimed at different groups in the population and contained many self-contradictory messages. Nonetheless, by stretching and distorting, the nazis tried to give a rational framework and philosophy to their propaganda. The technique of the prototype, or *Vorbild*, was the device used. It involved the construction of an ideational model on such comprehensive and extreme terms that it gave a framework for many stereotyped conceptions. For example, a prototype of the plutocratic, evil British leader was built up by the German radio into which all the errors and weaknesses of British policy and history could be fitted and to which all accusations against Germany could be referred and refuted.

France the Main Target.—The greatest application of German psychological warfare came before the real war in the west and was aimed first at weakening the will of the European democracies to fight, and later during the "sitzkrieg" at creating false feelings of security. Just as the genius of Hitler on his rise to power in Germany lay in his perception of the rottenness of the German social structure, so he saw clearly the weakness of the European democracies, torn by class discord, divided by political and economic dissension, imbued with pacifism. France, as the most demoralized country of Europe and as the most powerful continental enemy in the west, was the chief target.

The principle of audience stratification was fundamental in nazi strategy. Much of their propaganda was not aimed at Frenchmen in general but was differentially pre-

pared for the various strata in French society. The logic of this approach was that it permitted the most complete exploitation of the beliefs, fears and attitudes of the many groups making up a nation. The upper-income groups who had the most to lose from any revolutionary change were quietly approached through nazi agents and nazi sympathizers who represented fascism as the best protection for their privileged positions. It must be remembered that for the upper classes in Europe the spectre of communism and revolution was not imaginary. Socialistic and communistic movements had strong mass support; soviet Russian precept and example were ever present, and the capitalistic system lacked the youth, vitality and margin of safety characteristic of U.S. economy. Not only were there native fascist movements openly operating as such in England and France, but there was unconscious sympathy with some aspects of fascism in high places. After all, Hitler had smashed communism in Germany, had liquidated the labour unions, had preserved law and order and property rights.

To the French workers, the nazis stressed the futility of the sacrifices and destruction of an imperialist and capitalist war. Why should the common man bleed and die in a plutocratic war which filled the pockets of the rich? The nazi appeals also capitalized upon the anti-militarism and pacifism of the French masses. What quarrel did the French workers have with the German workers? A strong military could be looked upon as the army of the people, but it could also be regarded as the repressive agent of the reactionary elements in the state, and the German propagandists did not overlook the latter theme.

While the French upper classes were reached more directly through agents and sympathizers, the middle classes were the target of the written and the spoken word. Their own small holdings made their security more precarious than that of the moneyed groups and so made them more apprehensive of any fundamental change, whether war or revolution. They were especially susceptible, moreover, to one of the most common nazi dissolvent techniques, anti-Semitism. The success of this weapon was due to the clever nazi exploitation of elementary psychological processes. The victims of the propaganda were people emotionally upset and insecure who lacked thorough knowledge and penetrating insight into the real causes of the national and international crises affecting their lives. Moreover, the correct localization of the real causes meant the facing of unpleasant and difficult truths, including the terrible catastrophe of another world war. Thus, if the pent-up emotions and anxieties could be released against a plausible scapegoat, people could apparently get rid of their troubles without the dangers and hardships of a war or revolution. The Jews were few enough in number to afford a safe release but conspicuous enough to be targets. Moreover, the nazis went to great pains to show that it was the Jewish international financiers who were plotting war, and it was the Jews in the nation who were the war mongers. And to the middle classes the Jews were presented as the big capitalists taking advantage of the smaller people, almost in the same breath as the Marxists, who were undermining the social order and agitating for revolution. Anti-Semitic propaganda was carried on first by supporting native anti-Semitic organs with encouragement, ideas, examples and funds. Then, as the war grew nearer, the streets of Paris and other cities were littered with violent leaflets printed in Germany.

Another form of dissolvent propaganda used by the

nazis internationally was also directed at France, namely racial and social separatism. German agents were at work in Alsace and Brittany fostering separatist movements. The Breton paper, *Breiz Alao*, reflected not only Breton aspirations but the main themes of German propaganda.

To achieve their purposes, the nazi masters of psychological warfare maintained a network of espionage and subversive agents in France. Their methods varied from infiltration into polite society to actual political crimes. They were adept in planting and developing rumours which would either support their propaganda themes or serve to confuse the French people. They were liberally supplied with funds and used them effectively. In the summer of 1939, Premier Édouard Daladier finally started a counteroffensive. The news editor of the semiofficial *Temps* and an advertising executive of the patriotic *Figaro* were arrested for accepting bribes from the German government to do espionage and propaganda work. The extent of the German infiltration was evidenced by the fact that Daladier's speech in the French chamber mentioning the existence of the network of "propaganda, espionage and worse things" was expurgated by the French appeasement press.

The objective of stimulating the selfish interests of segments of the population, encouraging class warfare and fomenting racial and social separatism was twofold: an immediate national indecision and paralysis in time of crisis, and a long-lasting social decomposition which would make difficult the rebuilding of national spirit even in war. To achieve this demoralization, the nazis not only set group against group but worked zealously to undermine confidence in government officials, in the printed word, and in other accepted channels of authority and social control. Lawlessness was encouraged, and events like the crash of the Mendelssohn bank were played up to destroy faith in national institutions. The contradictions between official French policy and French concessions to Germany were exploited. A false-news phobia developed in France as the Munich crisis ripened in which the people and the press refused to believe truth and fiction alike. Everything was regarded as propaganda no matter what its source or its content.

The dissolvent propaganda working from within was but one phase of German psychological warfare. German foreign policy and the actions of German officials were manipulated to produce a war of nerves. The strategy was the constant creation of crises in international events.

In their skilful conduct of the war of nerves, the Germans would often rely upon the press in the democracies to do their work for them. An official German speech or a semi-official statement in the German papers would be seized upon for its news value and reproduced and given headlines in France or England. Sometimes the technique was a calculated indiscretion revealing German military or diplomatic plans to the enemy intelligence services. Paris and London thus had knowledge of the plans for the occupation of the Rhineland, Austria, Czechoslovakia and Poland weeks in advance of the actual event.

During the first phase of World War II, when the German armies were occupied in the east, the object of psychological warfare was to hold the line in the west by creating false feelings of security among the western Allies. Fraternization, propaganda and tactful resistance to limited French advances were employed. In places where the German troops withdrew from their frontier posts, they left placards with such messages as, "French soldiers, we have no quarrel with you. We shall not fire unless you do."

Until they were ready to strike in the west, the Germans



Leaflet urging German soldiers to surrender with safe-conduct passes, dropped behind German lines by soviet planes in 1942. At the top are newspaper notices of German soldier deaths, and to the right, a caption tells of the mourning at home ending, "Do you really wish to see YOUR name in the papers within black borders one day?" Below these are photographs found on dead German soldiers

strove to maintain the appearance of a "phony" war, with many acts of concern and chivalry toward the French in the front lines. The pretense of wanting peace did not deter the German propaganda machine from its exploitation of terrorism in threats to wipe out Paris by air attack, and in hints of a secret deadly weapon.

Methods Used in the United States.—Similar techniques were employed against the United States before that nation's formal entry into the war. A definite effort was made to divide and confuse Americans by short wave programs aimed at different interest groups in the United States. In this attempt at stratifying appeals directed at the frames of references of the various U.S. publics, programs were instituted for housewives (Zeesen Women's Club), the intelligentsia (The College Hour), midwesterners (Dear Harry and the Folks Back Home in Iowa), business men (Economic Review), the upper classes (Constance Drexel), anti-Semites (The Jew in American History), white collar workers (Gertie Hahn), the unemployed (Jim and Johnny), New Yorkers (Mr. Okay),

scandalmongers (Political Cabaret). Studies by the Princeton Listening Centre established, however, that these programs never achieved any sizable listening audience in the United States. The U.S. public was too fixated upon domestic variety programs to bother about trying to get German short-wave broadcasts. The German short-wave had some effect, nonetheless, in reaching its sympathizers and feeding them psychological ammunition. German Bundists and native fascist groups followed the propaganda line of the broadcasts, and U.S. counterintelligence measures identified nazi fellow-travellers through the careful analysis of German propaganda themes by the monitoring service of the Federal Communications commission.

German attempts to preserve U.S. neutrality resembled its methods on the continent but were on a reduced scale. Its diplomatic and consular services in the United States contained agents whose main function it was to influence U.S. business men in Germany's favour and to get accounts from the German point of view into books, pamphlets, magazines and newspapers. The German Library of Information was set up in the United States in 1937 by the German propaganda ministry. Other nazi propaganda agencies in the United States appeared under the names of the German Railway Information service, the German-American Chamber of Commerce, etc. German inspired and financed propaganda had some slight measure of success. Its messages, for example, occasionally found their way into congressional speeches.

German short-wave broadcasts to the U.S. and the activities of the German Library of Information were negligible compared with the clever use of the U.S. press by the nazis. The main device of Goebbels for getting space in the U.S. press was to utilize the actions, anticipated actions, speeches or probable speeches of officials of the German nation. Thus, while a U.S. newspaper would quickly reject a direct handout from a nazi press agent, the actions and statements of German officials were regarded as news. U.S. correspondents in Germany felt compelled to file such stories or find themselves scooped by a representative of a rival paper.

The nazis were also adept at story planting. While U.S. correspondents were still in Germany they were occasionally permitted to observe activities about which they could cable their papers. But what they were permitted to see was so arranged as to plant an idea or an inference for their reports. Thus, in May 1940, the Germans allowed selected correspondents to travel with the armies and to see at headquarters what appeared to be important maps suggesting the plans of the high command. At the moment the Germans were really preparing to sweep south against Paris, they saw to it that U.S. reporters convinced themselves that the attack would be across the channel against Britain. Neutral capitals in Europe were the main source for planted stories, and both sides used the press in cities of neutral states to confuse and deceive their enemies. In fact, neutral countries remained until almost the end of the war the psychological battleground of the belligerents for espionage, counterespionage, subversion and propaganda.

German psychological warfare failed to achieve any success in the United States comparable to its victories in Europe. One important factor in this failure was not the superior acumen or wisdom of Americans but their better individual morale. The nazis had had for their victims in Europe both inside and outside of Germany, people easily confused and browbeaten because of their

privation, suffering and basic defeatism. Americans, because of their political and international naïveté, were also easy to confuse, but on the other hand they were difficult to terrorize because of their more fortunate political and economic heritage.

Japanese Use of Racial Propaganda.—The Japanese borrowed much from Hitler, including many pages from *Mein Kampf*. Their propaganda machine and fifth column tactics paid rich dividends. Outstanding in their propaganda was the favourite nazi theme of racism, modified slightly to make the yellow skin superior to the white and the Anglo-Americans rather than the Jews the scapegoat. The Japanese cry was "Asia for the Asiatics" and they held out promises to the Burmese, the Malaysians, the Hindus, the Filipinos for a place in the "Asiatic co-prosperity sphere." To many of the peoples of the east, Japanese appeals made all sorts of sense, for they had long been subject to the economic, social and in some cases political domination of the whites. The Japanese made much of the U.S. treatment of the Negro, and they eagerly seized upon the Detroit race clashes and exaggerated them into a major race war. Though many Burmese went over to the axis side, and Malayan soldiers deserted to the Japanese, and even Filipinos were affected, the Chinese continued to resist their "liberators" with all their power.

British Use of Psychological Warfare.—The democracies were at certain disadvantages compared to the dictatorships in the use of psychological warfare, and Great Britain was no exception. The Germans could co-ordinate their psychological with their military and economic weapons. The distrust of propaganda in government hands in the democracies, however, restricted it to a very minor role and a role often not integrated with military action. In Great Britain, the ministry of information was not represented in the cabinet and did not enjoy the full confidence of the military services. So poor was the rapport between the military and the ministry of information that official British broadcasters trying to rally a world audience to the Allied cause often did not have as much information on the course of military events as appeared in the private U.S. press. The difficult position of the minister of information in England led to a succession of ministers in the early war years and to the feeling that the ministry was the graveyard of political careers. In the United States, too, the Office of Facts and Figures was an orphan which after a short period of abuse was pushed out of the way for the step-child, the Office of War Information. None of the democratic states devoted a fraction of the resources to psychological warfare that Germany invested.

Before the United States' declaration of war against Germany the British were active in presenting their case to the American people. Their policy, however, was not to try to propagandize the U.S. directly by fabricated emotional appeals. They were content to present facts and interpretations without appeals for help. There was no rigid ideological line laid down to which British spokesmen had to adhere. The British Broadcasting company turned its microphone over to representatives of all segments of English society and allowed them to tell the U.S. their stories with little regimentation. Thus, British speakers would often show inconsistencies of interpretation; from Hugh Walpole's Christmas card picture of charming England to J. B. Priestley's class-conscious version of English society at war. Some English broadcasters condemned the German nation as a whole; others were careful to distinguish between the German people and the

nazi leaders. Though the lack of a central ideological theme contrasted strikingly with the crisp, definite goal of the nazis, the more democratic and intellectual British presentation had a freshness and convincing quality compared with the cut-and-dried mouthing of nazi stereotypes. U.S. sympathies were won most completely not by high-pressure sales methods but by the tales of the simple, unaffected heroism of the English people under the ordeal of bombing.

The British story to the rest of the world was similar in nature to her informational campaigns directed toward the United States. In reaching the people of the western world, the nazis were constantly on the offensive. They spoke as the representatives of a new revolutionary cause and they held out new symbols to crystallize discontent and aggression. The British answers were a tame defense in that they had no new slogans, no new formulae. They fell back upon the old concepts of political democracy and Christianity. But British tenacity and courage helped to hold the psychological as well as the military front in the dark years of the war.

The United States and Psychological Warfare.—In the United States, as in Britain, the distaste for propaganda and the feeling against government competition with private industry in news services meant a belated preparation of the "fourth fighting arm." It was not until five months before Pearl Harbor that President Roosevelt created the Office of Coordinator of Information to channel U.S. news to the outside world. And it was not until seven months after the United States was actually at war that the Office of War Information was established. OWI was given the task of public propaganda abroad. Its broadcasts and printed materials were openly addressed to enemies and neutrals. The undercover and subversive aspects of psychological warfare were reserved for the Office of Strategic Services, functioning under the joint chiefs of staff. The undercover work of OSS was often psychological warfare or closely related activity. It carried on espionage in axis and axis-controlled countries, fed the axis false intelligence, aided the underground movements by furnishing them with supplies and arms, by directing their sabotage and by giving them propaganda materials and plans.

The overseas task of OWI was twofold: (1) the broad strategic purpose of reaching the minds of the people in other countries with accurate and adequate information about the strength, vitality and determination of U.S. democracy to hearten the United Nations and to discourage the axis powers and (2) the specific tactical objective of demoralizing axis troops in designated areas and facilitating their surrender. In carrying out the first objective, radio programs in 40 different languages or dialects were beamed to all parts of the world. The "Voice of America" constantly presented hard factual news about the war to information-starved people in axis and axis-controlled countries, together with documented accounts of the U.S. way of life.

The second tactical objective was achieved through the Psychological Warfare Branch of the army. This was an administrative device for integrating psychological warfare activities in combat areas. It was made up in part of British operatives, of OSS and military personnel, but dominantly of skilled and trained OWI specialists, operating under the theatre commander. Combat teams from PWB worked in the front lines with mobile presses, with radio and with sound trucks. OWI also had a home-front function, not of general propaganda to the American people, but of combating nazi tricks in news distortion



A dangerous salt shortage in Burma during 1945 prompted the OWI branch of psychological warfare to drop two-ounce packets of salt on Burmese villages

and of publicizing specific governmental campaigns such as war bond drives, salvage campaigns and blood-donor drives.

In the first stages of the war, OWI propaganda was on the defensive. It sought to counteract the myth of invincibility of the German new order and the weakness of the "decadent democracies." Especially in Australia and China was U.S. propaganda a shot in the arm to peoples who had suffered a succession of defeats and seemingly faced annihilation.

U.S. propaganda activities took the offensive as its military campaigns got under way. In North Africa the Psychological Warfare Branch had two assignments: to break the morale of the axis troops and to protect the rear of the Allied forces by winning over the native populations. PWB in the Mediterranean theatre used radio, leaflets, photographs, publications, motion pictures, public address systems (or mobile units). Almost 10,000,000 pamphlets were dropped on axis troops in the last ten days of the African campaign and helped in the rapid collapse of the army under Juergen von Arnim. In Tunisia, a black-market developed for the safe-conduct PWB leaflets because of the readiness of the Italian soldiers to surrender. Not only were leaflets showered on axis troops from the air to prepare their psychological demoralization, but combat teams in the front lines produced their own tactical leaflets on their mobile presses which could be disseminated by base-ejection shells to the specified areas designated by army commanders. An OWI radio engineer was instrumental in effecting the surrender of the Italian fleet by switching a PWB radio transmitter in Algiers to the international distress frequency listened to by ships at sea and directing the Italian warships to designated Allied ports.

In the Pacific area, propaganda was directed not only at the Japanese people and soldiers but also at the Japanese leaders. PWB carried out a constant campaign of ridicule against the Japanese admirals who would not come out and fight. Some military authorities credited this campaign as an important factor in forcing the Japanese navy into its disastrous battle of Leyte gulf. The importance of U.S. propaganda for the Japanese leaders was indicated by the fact that as the war progressed the Japanese printed every important U.S. broadcast in a

daily digest for 500 top political, industrial and military leaders. The careful attention of both countries to the propaganda lines of its opponent made for an indirect form of communication which furnished a new type of machinery for preliminary unofficial peace feelers.

Psychological warfare in the hands of the Allies had no spectacular success comparable to the Nazi weakening of France before the blitzkrieg. Allied propaganda did not so much undermine axis morale before military attack as it facilitated victory and made possible the full exploitation of military success. Moreover, it proved of great usefulness in reviving and maintaining the spirit of the people in axis-controlled countries during the critical period between the U.S. entry into the war and the arrival of U.S. might on the front lines.

Though the emphasis in this account has been upon propaganda and diplomatic techniques which were clear-cut examples of psychological warfare, it is true that no sharp line can be drawn between psychological and military warfare. The German conduct of military campaigns was compounded of both military and psychological concepts. This was clearly apparent at the simple level of specific stratagems, as for example the use of screeching dive bombers to break the morale of unseasoned troops, or the device of exaggerating the strength of artillery and mechanized forces by wooden guns or other faked weapons. But the very conception of the use of military power was psychological in nature. The propaganda effect of blitzkrieg depended upon some objective basis in fact of sudden, devastating and irresistible force.

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Psychology

Although World War II cut heavily into traditional research of the pure-science type and reduced the number of professional psychologists in graduate training, it nevertheless stimulated the growth of psychology and acted as catalyst to vitalizing trends within the youngest of the natural sciences. In numbers alone the record was of interest. In 1935 the American Psychological Association, professional organization of psychologists in the United States, had approximately 1,800 members and associates. In 1945, still a war year, the number had jumped to about 4,300. The trend toward psychology was apparent in the heavy registration for psychology courses in U.S. colleges and universities both by returning servicemen and by civilian students. A fairly typical study at the University of Illinois traced the percentage of students electing various fields for their major concentration over a period of years. In 1934 psychology majors comprised only 3% of all majors in the college. In 1944 the number had grown more than fourfold to 13% of all majors, and 1947 figures would undoubtedly show a further increase.

War agencies and the armed services utilized psychology to a much greater extent than in World War I. In Jan. 1944, 64% of the male psychologists between the ages of 18 and 38 in the United States were in military service as compared with about 50% of the general civilian population in the same age group. And the great majority of this number were employed in a professional capacity. Moreover, of the psychologists not in uniform, 12% had been working on a full-time basis for government war agencies and 9% on a part-time basis. In addition, many

of the psychologists in the universities were working on research for the armed services through contractual arrangement with the Office of Scientific Research and Development.

General Trends

Two basic trends in psychology, accelerated by the war, were: (1) the extension of its subject-matter to give focal attention to behaviour at the integrated level of human action (motivation, personality and social relations), and (2) an increasing shift away from an elementaristic Newtonian approach to a dynamic, field-theoretical point of view. The older psychology was elementaristic in subject-matter in that it tended to concentrate on elementary physiological functions, on reaction time, on the sensory processes. Even the larger problems of learning, memory and judgment were approached in their simplest dimensions: the time it took to learn a list of nonsense syllables, the counting of errors in running a blind-alley maze, or the minimal differences that could be accurately estimated in lifting weights. This elementarism of the subject matter studied was paralleled by an atomistic methodology. Facts were studied in isolation, and the complex of forces affecting the processes under investigation were frequently ignored. Thus even the early radicals interested in the larger problems of personality and social relationships studied personality traits in isolation from the pattern of personality, or described the mechanism of social facilitation in crowd behaviour as if it were an independent and all-important determinant regardless of the context of the situation.

This early elementaristic emphasis was in good part an attempt to make psychology scientific. Just as Newtonian physics had been the early scientific approach in an older discipline, so a rigid atomism became the tradition of the younger science. Moreover, it held on because of the greater danger in the psychological field of a pseudo science in the too-ready embracing of complex problems, for the solution of which there was so much practical pressure. Nor was the danger imaginary, for popular psychologizing often supplied answers lacking in documentation. This served all the more to drive scientific psychology into an ivory tower and a search for experiments which would be rigorously exact but of little theoretical or practical significance.

The development of a psychology which could cope with problems at its own level without the sacrifice of scientific rigour was in part a gradual maturing within the field and in part the result of the depression years and World War II. Historical events gave psychology a changed perspective. Psychologists called upon to meet complex problems in times of crisis found that complexity was amenable to the scientific approach, and they returned to their laboratories with a new orientation. But the main vehicle of change was furnished by two great intellectual movements in the western world, Gestalt psychology and Freudianism. The early contact between these movements and U.S. psychology had created a few zealous converts, considerable active hostility and much indifference. Renewed contact led to increased controversy, and a great deal of effort was expended by both sides in a war of words. Traditional U.S. experimental psychology was highly critical, and not without justification, of the cult-like nature of these new schools of thought, of their lack of quantitative controls, and of their failure at rigorous definition of terms and concepts. But originally it failed

to grasp the essentially new way of scientific thinking in these movements, obscured as it was by unclear concepts, evangelical enthusiasm and other imperfections. Basically both Freudian and Gestalt psychology were part of the scientific revolt against static Newtonian principles, a revolt already a successful revolution in the older fields of science. The new conception sought not simple point-to-point correlations between isolated factors but the dynamic relations within a complex field of forces. This approach demanded that the relevant system of events be studied in its totality and that the predictive test be not one of finding the absolute weighting of single factors but of predicting the trends within a given event-system.

Effect of Gestalt Psychology.—In spite of continuing opposition at theoretical levels, the 1930s and 1940s saw the success of a process of infiltration in many specific lines of experimental investigation. The exodus of German psychologists from Nazi Germany helped, since they carried on their research in U.S. universities with U.S. co-workers (Wolfgang Köhler at Swarthmore, Kurt Koffka at Smith, M. Wertheimer at the New School for Social Research, Kurt Lewin at Iowa).

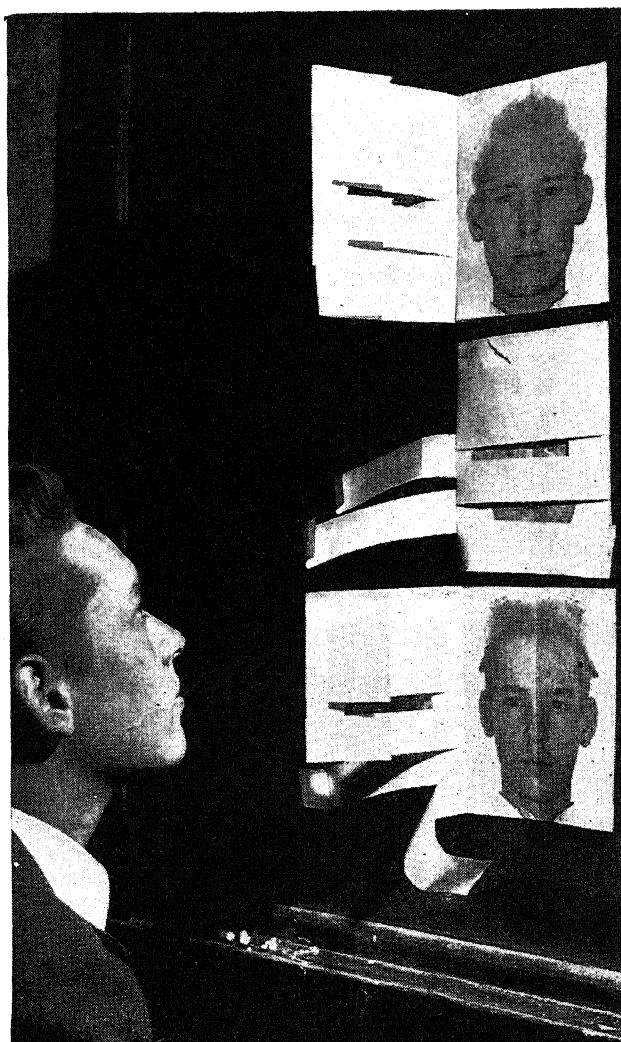
Typical examples of changes in the classical topics of psychology follow: (a) *Learning*, formerly dominated by mechanistic association, now recognized the role of meaning and insight—the sudden solution of problems through grasping the meaningful relationships. Köhler's old experiments on the modification of behaviour in the anthropoid apes through insight were confirmed by studies of humans and other animal forms. The superiority of insightful learning to rote memory was demonstrated by G. Katona. Subjects who understood the principles of various puzzles had perfect retention of the solution after the lapse of a month, whereas those who memorized only the solutions showed marked forgetting within the same period. (b) In *memory* the purely quantitative treatment of retention was modified to take account of qualitative changes which occur because the individual assimilates material to his particular patterns of meaning. The memories which an individual takes away from a situation are not a mere summation of the stimuli and temporal exposure but a function of his creative moulding of incoming impressions to his own framework of thought. (c) The greatest acceptance of Gestalt findings and concepts occurred in the field of *perception*. The modern textbook discussed the importance of the organization of the perceptual field, the determining effect of context, the nature of figure-ground relationships. Discriminative responses to the larger, greater or brighter of two stimuli came to be regarded as response to perceived relationships rather than to fixed stimulus-values. Experiments on figural aftereffects showed that the perception of shape and form is dependent upon the total experience of the present and immediately preceding visual fields. (d) Basic *biological drives* must take account of the relativity of appetite. The apparently physically satiated animal resumes eating when other animals are introduced into the situation; and the apparently satiated animal with part of its unconsumed meal before it will begin eating again if the food is taken away and immediately replaced.

While laboratory psychology in its absorption of Gestalt findings was undergoing gradual change, the more palpable transformation was in social psychology and the study of personality. The complex functions of social motivation, of personality integration and of group behaviour could not be adequately studied by mechanistic elementarism. Hence when Lewin in his field theory extended Gestalt conceptions into this area, they met with

ready acceptance and led to immediate research growth. Group effects were investigated not in terms of the mere increase in social stimulation in the group but in terms of group atmosphere and organization. Democratic group-structure produces less interpersonal hostility and scapegoating than authoritarian group-structure and, moreover, is much superior in motivation and resulting performance. In the authoritarian group, reward can only be attained competitively by praise from the leader, whereas in the democratic group reward can be enjoyed by all since it comes from accomplishment in the task. Aspiration levels proved a fruitful concept to measure the purposive, integrated strivings of personality. Discrepancy between aspiration and achievement levels became a valuable index of personal frustration. Leadership when used as a relational term to describe the relations between leader and follower does away with the search for some mystic personality quality of leadership. In this contextual meaning the leader must possess membership character in the group he is leading, in terms of similar traits or similar values to those of his followers, as well as definite superiority to the group in other characteristics. Research studies showed that the relationship could be dominative between leader or follower or integrative, with the integrative type having better natural chances for surviving.

Effect of Freudian Theories.—Freudian and Adlerian doctrines, although older than Gestalt conceptions, took an even longer period to affect U.S. academic psychology. Since Freudian theory developed outside the laboratory and since its ideological aspects were sometimes difficult to separate from its scientific features, its fundamental methodological contributions did not have a thoroughgoing influence on traditional psychology until the 1930s. This came about in two ways: one indirect, the other direct. Psychiatrists, clinicians, and practitioners of all sorts found its ideas and techniques extremely useful. Abnormal texts, personality treatises and even general texts, though written by academic psychologists, often hostile to anything labelled Freudian, unwittingly employed many of the mechanisms of human behaviour described in the clinical literature and derived from Sigmund Freud. Thus, even while Freud was rejected in name, standard writings mentioned identification, projection, displacement, fixation, regression, sublimation, compensation, rationalization and defense mechanism. The second way in which Freudianism made itself felt was at a more direct and deliberate level of acceptance. Clinical and social psychologists evaluated Freudian doctrines systematically, revised them and applied them to their problems. The result was a neo-Freudianism which retained Freud's dynamic point of view and his emphasis upon developmental processes, sought the validation of hypotheses in research, and rejected any unverifiable assumptions about sex in the older Freudian system. The emphasis was not upon rigid stages in personality development but upon the importance of the socialization process as an interaction between the child and the institutional demands of the culture implemented through human agents. Leaders in this movement were A. Kardiner and K. Horney.

The right wing of this movement appeared in attempts, centring at Yale University, to find simple experimental analogues of Freudian mechanisms, or to formulate simple hypotheses suggested by Freudian psychology for research verification. The best-known attempt was the frustration-aggression formula, tracing latent and overt hostilities to the thwarting of either biological or ego drives. These



Self-analysis was advanced as one of the methods of experimental depth psychology by Dr. Werner Wolff, expatriate German psychologist in the United States, in his book *The Expression of Personality* (Harpers, 1943). In one test, the subject was asked to comment upon two composite photographs of himself, taken without his knowledge. The portrait was split down the middle, reversing one half, and fitting it against the remaining half. The subject's reactions to his "left" and "right" faces, usually strongly negative or positive, provided definite clues to his personality, according to Dr. Wolff

efforts, though too atomistically conceived, were leading to more sophisticated research.

Related to the broad sweep of field systems such as Gestalt and Freudian psychology was the more native development of purposive behaviourism and event-system theory. E. C. Tolman and his students explored motivational problems on the molar, as opposed to the molecular level, and considered actions in the broad context of the purposes served. Thus Tolman demonstrated the fallacy of simple reward-punishment associationism by an experiment in which subjects shocked electrically for making the right responses learned as readily as subjects shocked for making the wrong responses. In the broad context of mastering the whole problem, punishment for specific actions served not as punishment but as an effective signpost for successful learning. F. H. Allport, independently of Gestalt workers, formulated an elaborate event-system theory to provide methodological concepts and tools for a more scientific approach in social psychology. This system, though a major contribution, was not as effective or as useful as Lewinian field theory, in good part, because

662 of the forbiddingly difficult nature of its language and formulation.

An important tool for the study of complex dynamics came from R. A. Fisher's factorial design, a method for the study of a number of independent variables in their simultaneous interaction. It was based upon computing the variances contributed by the component forces. The experiment was so designed that there was an experimental situation to represent every possible combination of factors being studied. The advantage of the method was in its economy, (several experimental factors could be studied simultaneously) and in its greater fidelity to real situations in which a number of factors exerted their influence in simultaneous interaction.

In spite of these powerful currents, there still remained the hard core of traditional elementarism in the Hull school of associationism, in the conventional psychophysical work on sensory processes, and in the item-reliability approach of the psychometrician. For some psychologists no assimilation seemed possible between the older laboratory psychology and the later concern with complex social-psychological problems. Indeed, the conflict threatened to split psychology into two separate branches, one allied to biology and the other allied to the social sciences. Harvard university decided upon this solution and in 1946 organized a new department of social relations, bringing together social and clinical psychology with sociology and social anthropology, while physiological psychology remained by itself as one of the natural science departments. Most psychologists, however, opposed this schism and believed an integration was possible. The desire to preserve psychology as a unified science, and at the same time not restrict its many interests, was implemented formally in the reorganization of the American Psychological association in 1944. The new organization, a federated structure with divisions set up according to functional interests, maintained considerable local autonomy for the various divisions, and a central governing body of divisional representatives. Thus the common ground as well as the specialized interests of the many branches of psychology were to be served. The new organization, moreover, devoted itself not only to the advancement of psychology as science but to its advancement as a profession and as a means of promoting human welfare.

In spite of the diversity of interests among psychologists, it should be noted that the trend away from elementarism made possible a common language and a common set of concepts. Memory, learning and perception as studied by modern field systems yielded findings not only of pertinence to social psychology but findings capable of formulation in the same conceptual language. Perception of the physical world, for example, in terms of organized wholes and of subjective structure supplying the lack of objective structure also applied to the individual's perception of social situations.

The Society for the Psychological Study of Social Issues, founded in 1936, stimulated and hastened the development of the new trends. Its main purpose was to further research in social psychology and to make research findings available for social welfare. By its interest in problems of the real social world it counteracted atomistic and ivory-tower tendencies in social psychology. Its three yearbooks, *Industrial Conflict*, *a Psychological Interpretation*, *Civilian Morale* and *Human Nature and Enduring Peace*, were co-operative research undertakings of large groups of workers

and were integrated symposia of psychological research and thinking on all-important contemporary issues.

Specific Advances

Against the general background of a broadening methodology and subject matter there were many specific advances. Some of the more significant developments were the following:

Heredity vs. Environment.—The nature-nurture controversy was resolved in fair measure by studies showing the way in which inherited and environmental factors interact. The old behaviouristic movement with its agnosticism of inherited doctrines went to the extreme of neglecting even the biochemical constitution of the individual. On the other hand, the heredity school had an oversimplified view of human character as the mere unfolding of traits carried by the genes. Research indicated, however, that the dynamics of behaviour determination are complex. The effect of heredity is indirect and is mediated by constitutional factors (the physical and chemical make-up of the individual) which in turn are mediated in their influence by learning. The genes help to determine, but are not synonymous with constitutional factors, since they operate not in a vacuum but in a physical environment of varying nutritive conditions, vitamins, temperature electrical gradients, etc. This interaction between the genes and the physical and chemical materials of the environment results in a glandular, nervous and physical constitution which is a determinant of behaviour, but more in a limiting than a direct fashion. For example, young children differ constitutionally in sensitivity of receptors, in autonomic threshold, in size of glands. Hence one child may develop a trait of emotionality more readily than another.

But the kind of emotionality and the degree to which it is developed is mediated through the nature of his experiences.

Thus some correlation exists between physical and glandular constitution and temperamental aspects of personality, though the correlation will never be a constant for all groups under all conditions. S. S. Stevens and W. S. Sheldon in an extensive investigation of the problem empirically derived three measures of physical type: (a) endomorphy, greater or less prominence of the abdominal region, or digestive viscera, (b) mesomorphy, greater or less prominence of bone, muscle and connective tissue and (c) ectomorphy, large surface in relation to mass; long delicate bones. Two hundred individuals were scored on these three dimensions and were also given a battery of personality tests. Clusters of personality traits, obtained through factor analysis, were found to be related to body types. Ectomorphy was definitely associated with this personality pattern: overly fast reactions, inhibited social address, restraint in posture, poor sleep habits, vocal restraint, youthful intentness and need of solitude when troubled.

Endomorphy accompanied this cluster: love of comfort, relaxation, pleasure in digestion, greed for affection and approval, deep sleep and the need for people when troubled.

Studies of animals also demonstrated the relation between temperament and constitution. C. Hall employed behavioural tests to determine degree of emotionality and fearlessness in rats. By controlled breeding, strains of fearless and emotional rats were obtained. Anatomical analysis of the glandular constitution revealed larger adrenal, thyroid and pituitary glands in the emotional than in the fearless animals.

Constitutional factors determine capacities and aptitudes but they do not set in absolute fashion a rigid degree of ability. Rather they mark the limits of a possible range of behaviour. Thus the skills and talents of most people can be appreciably improved by training, but the musical moron can never be made into a musical genius. While the I.Q. is relatively stable, a number of studies showed that it can be varied under changing environmental conditions. Foster children tend to change I.Q. in the direction of the level of the foster home. And Irving Lorge compared a group of boys who left school at the end of the eighth grade with a group matched in I.Q. who went on to complete college. A retest of I.Q. 20 years after completion of grammar school showed that the college group averaged 15 points higher than the noncollege group.

Training and experience are not as important for some elementary functions and at as early ages as was assumed by environmentalists. Wayne Dennis in a study of Hopi children found that those restricted in activity by being bundled to a stiff board in orthodox Hopi fashion walked as early as those who had been reared like white children without binding. Early activities of motor manipulation and co-ordination are more dependent upon maturation of biological factors than upon learning. The heavy emphasis of some Freudians upon the significance of breast-feeding and the early libidinal treatment of the infant for later personality development lacked experimental confirmation. Physiological rather than psychological forces are important in the early months of life.

Physiology.—Knowledge of the physiological basis of behaviour steadily increased through research involving destruction of nervous tissue and experiments with the effects of drugs and hormones on behaviour. Evidence accumulated, definitely confirming older views, that the function of the frontal lobes of the cerebral cortex is one of intellectual synthesis and elaboration and of inhibition of subcortical centres. Loss of the frontal lobes not only impairs the symbolic processes, but results in freer emotional expression. Work on both human patients and lower animals emphasized the importance of the frontal cortical areas for planning of activity, for anticipation, and for all organized patterns with a future reference. Prefrontal lobotomies on neurotics and psychotics had some measure of success. Though patients show a more ready emotionality after the operation, they also lose their deep-lying anxieties and other neurotic symptoms.

Laterality (the preference in the use of the right hand over the left, or the dominance of one eye over the other) is not a unitary system neurologically. Sectioning of the corpus collosum can affect some functions involving sidedness but not others.

Records on human patients with brain lesions, who sleep inordinately, had long suggested a "sleep centre" in the hypothalamic-mesencephalic region of the brain. Experimental tests were made, therefore, on monkeys by destroying various subcortical centres and observing subsequent behaviour. In cases of injury to the hypothalamus and mesencephalon, somnolence generally ensued. In his phylogenetic theory of sleep O. Kleitman localized a wakefulness centre in this part of the brain. According to this theory, the wakefulness centre would ordinarily follow a shorter rhythm of activity and rest as in the lower animals, if it were not for the activity of the cortex. A high degree of cortical functioning activates the lower wakefulness centre. In turn the centre acts as a priming mechanism to keep the cortex on the job. During sleeping or waking the normal vegetative activities of the organism are maintained, but the wakefulness centre is necessary

to sustain the higher integrative cortical process.

Attempts to establish a biochemical basis for the functional psychoses were numerous but without definitive results. Schizophrenia, with its progressive deterioration, had long impressed clinicians as an organic condition. Some studies did report a relation between specific toxins and schizophrenia, and R. Lemere as a result of his electroencephalography investigations regarded a low-energy cortex as the origin of the disease. The conflicting evidence and the long history of failure in this type of research suggested that the functional psychoses are not organically based, in the sense of arising out of specific toxins or specific physiological conditions, but are functions of total nervous organization. This theory did not reject the possibility of a re-enforcing biochemical specific as one aspect of the disordered condition which helps to set up a strong circular process of malfunctioning. Much had been claimed for insulin and other chemical treatment of mental breakdown—especially if combined with psychotherapy. By changing body chemistry and thus breaking up the circular re-enforcing processes, the drug treatment may give psychotherapy the necessary entering wedge for re-education. Shock treatment may also help recovery by breaking up the neural organization of the poor adjustment of the personality. There was some evidence of memory impairment for recent events attributable to insulin or electric shock. After the convulsions and coma, the personality must reintegrate and may fall back upon earlier and more wholesome habits of response than the recent schizophrenic pattern. (See also BIOCHEMISTRY; PHYSIOLOGY; PSYCHIATRY.)

Personality Tests.—Projective methods for the evaluation of personality came into their own within the decade 1937–46. Paper-and-pencil tests of character and temperament were atomistic and superficial, though they had still their uses for rough group-screening. The projective test was a clinical development. Instead of an inventory of more or less direct questions with limited and fixed alternative answers, it presented unstructured and incomplete situations. In responding to these situations, the subject "projected" into his answers his own frame of reference, his own motives, his own conflicts. The most famous projective instrument was the Rorschach ink blot test. Coloured blots of various sizes and shapes were presented on cards to the subject for his interpretation. Another widely used device was the Murray thematic apperception test, a series of pictures which the respondent was asked to use for plots of his own construction. These tests were employed extensively in clinical psychology for diagnosis, in developmental psychology, in vocational guidance and in personality research. The literature in this field covered hundreds of titles.

For a long period the projective tests were handicapped by lack of demonstrable evidence to support the ambitious claims sometimes made for them. In its very nature of seeking qualitative and uncontrolled responses, the test did not seem to lend itself to rigorous standardization and statistical checks. But by abandoning the traditional item-validity approach and seeking for quantitative checks in broader dimensions, the reliability and validity of the projective methods were established. In one study Ruth Munroe gave the Rorschach to a group of university freshmen, wrote "blind" personality descriptions on the basis of the test results and asked teachers who knew the subjects to match the descriptions with the names of the students. The sketches were matched perfectly. In a

further experiment predictions of academic success were made on the basis of Rorschach protocols and were found to be radically wrong in only 4 out of 178 cases. Other predictions of adjustment correlated .65 with a teacher rating of adjustment. Against the objective record of actual behaviour, including referral to a psychiatrist, academic failure and problem behaviour observed by teachers, the Rorschach predictions also fared well. The Bernreuter paper-and-pencil inventory, in contrast, completely missed some of the most seriously maladjusted students.

Similarly, the thematic apperception test was validated at Worcester State hospital. The test was administered to 40 patients unknown to the experimenter, who then wrote thumbnail sketches of their personalities, made I.Q. estimates and prediction as to disease classification. The sketches were successfully matched with the identities of patients, and the predictive estimates were accurate in more than three-fourths of the cases.

The significance of the validation of projective methods was far reaching. It illustrated the possibilities of bringing into the scientific realm the rich qualitative materials generally regarded as belonging to the intuitive, the aesthetic and the practical worlds. The projective technique was extended to the field of children's play activities. Children's use of play materials afforded insight into their personalities, their way of thinking and of feeling.

Social Psychology.—Social psychology had a mushroom growth. Until the middle 1930s Allport's classic text of 1924, with its emphasis upon the elementary functions, remained the standard work. After 1935 no less than eight major texts, and many research monographs and theoretical volumes carried the psychological approach into the most complex social issues. One aspect of this growth was the expansion into those areas of social science where the problems were regarded as problems of human behaviour, notably the formation and measurement of public opinion, the analysis of propaganda and its effects, the study of labour-management relations and industrial conflict, and perhaps most significant, the investigation of the dynamics of culture. In fact, the unity achieved at Harvard in the formal merger of social psychology and social anthropology reflected the co-operative research and the cultural diffusion and borrowing between anthropology and psychology. Anthropologists turned to psychological findings for an understanding of motivation. At the Yale Institute of Human Relations part of the training of anthropological field workers was thorough knowledge of the techniques of psychoanalysis. As a consequence the ethnological field-account of primitive peoples began to give attention to the personality development and motivation of its characters.

In turn social psychology eagerly seized upon comparative materials from various cultures showing both the similarities and differences in human reactions to basic stimulus-situations. The ethnological contributions greatly aided the distinction between the phenotypical, or variable surface manifestation, and the genotypical, or deep-lying principle. Too often in the past, the practice had been to regard any observed phenomenon in an individual culture as a fundamental trait of human nature. For example, psychoses and psychoneuroses had often been defined in terms of symptoms such as delusions of persecution or trance-like states. Anthropological accounts showed, however, that in some cultures these manifestations are the socially approved way of behaving, and are not indications

of abnormality. Hence in modern psychology it became necessary to define abnormality at the genotypical level, *i.e.*, the nature and degree of internal conflict and resulting personality disorganization.

The work of A. Kardiner and his group, reported in the two volumes *Individual and His Society* and *Psychological Frontiers of Society*, illustrated the possible fusion of anthropology and psychology. This account of psychodynamics was the definitive answer to the static conception of social behaviour held by the extreme culture determinists and by the extreme nativists. The one group saw human beings as the mere carriers of social norms, each generation automatically acquiring the social norms of the preceding generation much as their opponents, the nativists, saw social behaviour as the reflection of inherited traits. Both the advocates of social inheritance and the adherents to biological inheritance were alike in a point of view that could explain neither social change nor even social stability. Kardiner, however, put major attention upon the socialization process as the important dynamic in personality development and subsequent social behaviour. The way in which the many specifics of early disciplines and sanctions are applied in relation to the particular needs of the growing child, the impact of maternal care, sibling interactions, paternal dominance or absence—all establish action systems which in their interactions yield basic personality. Projective systems arise out of the early action systems and determine religion, folklore and the arts. Reality systems supplement the projective systems and deal with explanations of the outer world, ways of dealing with it, or conventionalized means of getting along with others. This developmental approach grows out of a careful analysis of several primitive societies.

While Kardiner and the Yale group were working on fundamental psychodynamics in comparative cultural studies, specific techniques for field research employing quantitative controls evolved rapidly in the war years in opinion and attitude surveys. These techniques gave promise of revolutionizing social psychology. They provided a way over a main stumbling block to scientific progress in the social field—the problem of the measurement or control of the significant forces affecting social action. The bulk of social science observations had been prescientific. These observations may or may not have been accurate, for they were not reported in a manner allowing for verification. And since there was no measure of the extent of their accuracy, no generalizing functions or predictions could be derived from them. For example, Willard W. Waller's superior book, *The Veteran Comes Back* (1944) gave excellent insights into the problems of returning servicemen and the mutual adjustment between veteran and civilian. But with no quantification of these observations, no knowledge of the gravity or extent of the anticipated maladjustment was possible.

Opinion polls had demonstrated that even rough sampling techniques gave accurate predictions of voting behaviour from very small samples. The census bureau and the division of program surveys of the U.S. department of agriculture refined sampling procedures so that a study of a small fraction of the population would give accurate estimates of the number of people redeeming their war bonds within a given period, the prospective buying behaviour of different income groups for various commodities, or the morale of workers in a given type of industrial plant, etc. By making the reactions of the individual the standard unit, behaviour variables could be reliably identified and measured. But it was also important that the variables measured be truly significant. The ready quantification

according to a precoded set of simple alternatives would often miss human motives, conflicts, aspirations and ideology. Two techniques were devised and successfully used for an exploration and measurement of significant variables—the nondirective depth interview and the subsequent coding of the rich interview materials. The depth interview conducted by a skilled, trained field worker emphasized rapport with the respondent, who was encouraged to talk in narrative style on the whole subject under discussion. This topic was set in as broad a frame as possible, and as the respondent proceeded, the questions gradually narrowed the discussion to specific phases of the problem. The recorded ideas and feelings from such interviews were later examined by expert coders, who set up quantitative ratings and dimensions according to the nature of the interview material. These ratings and dimensions were checked independently by a number of coders for reliability and revised until reliable measures were obtained. With these techniques and with adequate psychological knowledge for devising a study with experimental design, the problems capable of scientific attack in the field of human relationships became almost limitless. (See also PUBLIC OPINION SURVEYS.)

Another less crucial stumbling block to a scientific social psychology was the inability to control and manipulate the social world as a physicist manipulates his materials. Actually, however, social change occurs frequently enough so that adequate field studies, strategically placed, could go far to remedy this weakness. A. Leighton, to take one instance, carefully observed the social upheaval in a Japanese relocation centre housing Nisei, Issei and Kibei groups. In this situation the dominant position of the U.S.-born Japanese, the Nisei, over the older generation of Japanese was reversed. In spite of their familiarity with U.S. ways they, too, were outcasts and the older-generation Japanese resumed the role that their culture prescribed for them. Here then was a natural social situation with something of the setting of an experiment. Moreover, action programs could be experimentally planned with accompanying research evaluation. The Commission on Community Interrelations embarked upon a program of bringing about better relations in the community among different religious and racial groups. In formulating its plans, it provided for constant checks on the effectiveness of various procedures for modifying social behaviour. Its work showed the importance of effecting change not through exhortation or propaganda but through active role-playing by community members themselves. If the community could be encouraged to study the problem itself and to work out its own program, more was accomplished than by the usual informational and educational approach. This further extended the accepted psychological principle of active participation and role-taking as the important factor in behaviour modification.

War Activities

The United States made more use of psychologists in World War II than any other nation. Though the very term "military psychology" was associated with Germany, German psychologists were utilized largely in the selection of officers and key military personnel. Clinical psychology was in good part neglected, partly because the official military attitude was to deny the existence of psychogenic difficulties in the German soldier. Nor were social psychologists employed for the evaluation of morale or propaganda. Moreover, the selection program was discontinued in the German army and air forces in the middle of the war. This was due in part to weaknesses of quantitative

techniques in German psychology and the failure to obtain validating data for the tests. But another significant reason was the opposition by both the Prussian officer group and the Nazi party to democratic selection on the basis of aptitude and ability. The Prussian officers wanted candidates for officers to come from the old Prussian families and the nazis favoured preference for the boys who had belonged to the Hitler youth groups.

Even before the entry of the U.S. into the war the Emergency Committee in Psychology of the National Research Council started to mobilize psychological knowledge having to do with problems of human engineering in times of crisis and war. Bibliographical surveys of various aspects of military psychology appeared in the *Psychological Bulletin* of June 1941. The emergency committee continued throughout the war as a top advisory group for army personnel procedures. Under its direction, two volumes were prepared for the use of the army: *Psychology for the Fighting Man*, a popular condensation and application of psychological facts important for the serviceman, and *Psychology for the Returning Serviceman*, a summary for the returning veteran of psychological knowledge about his postwar problems. But the bulk of war research was carried on directly by the operating agencies interested in the results—the army, navy, the OSS and OWI. Research projects, contracted out to universities and colleges, cleared for the most part through the Applied Panel of the National Defense Research Council or some other agency of the Office of Scientific Research and Development.

U.S. Army Ground Forces.—The main uses of psychology in the U.S. army were in the classification and selection of personnel, in clinical problems of maladjustment, and in morale measurement. By far the most attention was given to the selection and classification program. The most neglected areas were in training, especially of leaders, and in the implementation of morale research.

Personnel procedures, including all testing, selection, assignment and related research were the responsibility of the Adjutant General's office, which was advised by a committee of prominent psychometricians under the chairmanship of Walter Bingham. Actual administration of personnel procedures was handled by the classification and replacement branch, A.G.O. Most of the officers administering the program in the field were psychologists and personnel technicians, especially trained for their tasks at the Adjutant General's school, established in 1941 at Fort Washington, Md. The central direction of the program came from the personnel research section of the classification branch, which as the operating agency of the A.G.O. was charged with the responsibility for the development, construction, validation and standardization of all personnel screening tests and interviewing techniques in the army with the exception of procedures for the selection of flight crews for the army air forces. This section was headed by the psychologists, M. Richardson and D. E. Baier, during the first period of the war. It concentrated its efforts primarily on problems of initial classification and of selection for specialist training. Its task demanded constant revision of the testing program, both because old psychological instruments had to be adapted to the practical requirements of military situations and because the needs of the army changed from time to time. In addition to tests, the section prepared standardized aids for field work for the classification officers, manuals of test administration, interview schedules and rating forms.

The initial step in the classification of the army recruit

was the administration of a minimum literacy test to detect the men who would not be able to absorb military training without special instruction. Illiterates were then given a visual classification test to eliminate those without sufficient native ability to learn military duties. For literate men the next step was the army general classification test, a test of general learning ability which replaced the army alpha of World War I fame. It was given to every literate inductee after Oct. 1940. It was revised three times before the end of the war on the basis of research findings, but all forms were roughly comparable and contained three types of items: vocabulary, arithmetic and block-counting. Men were classified into five groups according to the learning ability shown in the A.G.C. test, and many with superior scores were assigned to various specialist training courses. The correlations between showing on the A.G.C. test and grades in training courses ranged from .20 in teletype maintenance to .73 in aircraft warning. In addition, recruits took a mechanical aptitude test and the radiotelegraph operator aptitude test (later replaced by the army radio code aptitude test). For radiotelegraphy, experiment showed auditory discrimination to be less significant than a work sample test of code learning.

The value of the testing program for assignment according to aptitude was impaired by the necessity of adjusting to the constantly shifting quota demands of the various branches of the service. Men well-qualified for specialized tasks might have these qualifications ignored because the immediate quota-need was for routine army duty. And once assigned to a unit, reassignment was difficult because few commanding officers liked to release good men. Part of the failure to utilize superior ability and special skills more completely was unavoidable, but it was also true that better planning and less rigidity in reassignment were possible.

Men who showed poor learning ability on the test were placed in special training units under experts who had developed considerable original instructional material designed to increase motivation by its freedom from rigid and static content. In this way psychological training salvaged many recruits who otherwise would have been dismissed as mentally unqualified.

The need for highly trained technicians and for officers led to the army specialized training program in Dec. 1942. This program utilized the resources of the country's educational institutions and assigned soldiers to those colleges where the army had set up a curriculum. The A.S.T.P. included a basic phase and an advanced phase, the latter divided into various specialized curricula. Criteria for admission to A.S.T.P. included high scores on the A.G.C. test and an educational achievement test also prepared by the personnel research section. In addition, the section constructed standard objective tests to evaluate progress in A.S.T.P. courses. The 150-odd tests developed, constituted the largest single objective-testing program in the college field.

To increase the number of trained personnel psychologists in the army, one of the advanced A.S.T.P. curricula was devoted to personnel psychology. This curriculum, offered during 1943 at 11 leading U.S. universities and staffed mainly by psychologists, had an assignment of 1,350 candidates, a number of whom were later commissioned.

Clinical psychologists were assigned to a variety of tasks in the army. Their main use was in medical installations and hospitals. During 1944 the Office of Chief Clinical Psychologist was established to co-ordinate and supervise

clinical work in the army, and Lt. Col. M. Seidenfeld was named to this office. The program included clinical psychological services in all general hospitals of 1,000 or more beds. These services covered: counselling of convalescent patients who were expected to return to military duties, preparation and interpretation of clinical records and test results for the officer in charge, aiding in psychological problems related to retraining psychoneurotic casualties, and assisting in the determination of assignments consistent with the convalescent's physical and mental state. Clinical psychologists also served in developmental battalions where the task was one of reconditioning men whose morale had broken badly.

Another use of the clinical psychologist was in the rehabilitation centres of the individual service commands, where attempts were made to salvage certain offenders under court-martial conviction. At the disciplinary training centre in the Mediterranean theatre of operations, for example, a psychological clinic was established in which all prisoners were systematically tested and interviewed. Aptitude and intelligence examinations were supplemented by personality tests. A malingering key was developed in the testing procedure to detect simulated defects from bona fide failures on the principle that the malingerer would follow a different pattern of error from that of the genuinely subnormal person. The clinic made the following types of recommendations: restoration to military duty for trainees with no specific personality defects who were making satisfactory progress in disciplinary training; reclassification to limited duty for those showing psychoneurotic tendency; return to the zone of the interior for further rehabilitation for those with major defects of personality, either mental or emotional, and hospitalization for severe cases of neuroses and psychoses.

The clinical program of the army expanded in the closing years of the war to provide psychological and vocational counselling for veterans at separation centres. The pressure of discharging millions of men in a short period and the soldiers' eagerness for a speedy separation process meant that the major part of the job was left for the Veterans' administration.

The research unit of the morale division had the function of evaluating informational programs in the army and studying the enlisted man's reactions to army problems. The experimental section of this unit under the psychologist, C. Hovland, pretested films and educational programs on small groups before they were widely circulated through the army. A surveys section conducted attitudinal research on specific problems of morale using both oral interviews and written questionnaires. In this operational research a new instrument was developed in the Guttman scaling device, which simplified the determination of the true scales or dimensions of attitude by statistical grouping of answers to related questions.

U.S. Army Air Forces.—The A.A.F. utilized psychology in its selection and research program more thoroughly than any other branch of the U.S. services. The skills involved in piloting various types of planes, in navigation, in bombing, in aerial gunnery, required careful analysis and much experimentation for the construction of diagnostic tests. About 200 commissioned officers were assigned as aviation psychologists to the A.A.F. psychology program with approximately 750 enlisted men, many of whom had B.A. or M.A. degrees in the field of psychology or education. Col. J. Flanagan headed the psychological branch in the Office of the Air Surgeon.

Applicants for aviation cadet training had first to pass the aviation cadet qualifying examination which was vali-

dated against success in actual flying training. The examination included verbal, interest, perceptual, judgment, mechanical comprehension and mathematics tests, the most useful of which proved to be the mechanical comprehension and interest measures. Successful applicants were given basic training after this examination but still had to pass cadet classification tests which helped to determine the assignment to the separate training programs for pilots, bombardiers and navigators or to their rejection and assignment to enlisted aircrew or ground crew training. Research established these findings: (a) tests with heavy verbal-intellectual or mathematical loadings had considerable validity for the prediction of navigator success but were poor for pilot selection, (b) certain mechanical and information tests were useful predictors of pilot success, (c) other predictors of flying ability were psychomotor measures and a control-confusion test, sampling the individual's ability at delicate but rapid manipulations of controls in a complicated sequence under conditions productive of divided attention, (d) in general, aircrew success was related to previous active participation in sports.

As the war progressed, validation of the tests against combat performance became an important project. Emphasis shifted, too, from selection tests to instructional procedures to establish reliable and valid measures of progress and proficiency in training. Finally, attention was given to the design of the plane and its apparatus for maximum psychological efficiency in operation.

The significance of the contribution of psychologists to the A.A.F. was summed up in the second report of the commanding general of the army air forces to the secretary of war, Feb. 27, 1945, which read in part as follows:

The battery of 20 psychological tests used for classifying all candidates for pilot, navigator, bombardier, and aerial gunnery training has proved valid in predicting not only an aviation cadet's chance for winning his wings but also the flier's chance for combat success. In a follow-up study of both bomber and fighter pilots in the European theatre, it was determined that pilots who had scored highest in the psychological tests administered before they learned to fly tended to be rated by the squadron commanders as most successful in combat. Likewise, those who had the minimum acceptable scores appeared to be the most frequently missing in action.

The Aviation Psychology Program in the past year has been extended to a point where it contributes to the number of bombs which hit within the target areas . . . [It] has paid off in time, lives and money saved, and through its selection of the raw material has aided in the establishment of an effective combat air force. This has been done at a total cost of less than \$5.00 per candidate tested.

In contrast to the continuing development of U.S. aviation psychology, the Germans, as has been noted, gave up applied psychology in the middle of the war. The Japanese, however, copied old testing procedures in the selection of air cadets but their program was exceedingly limited as compared to U.S. efforts, and there was no attempt at discriminative aptitude scores for the specialized air jobs. It is of interest that the "kamikaze" pilots were not selected but were volunteers. The Japanese army, however, offered unusual rewards: the pilot could go on leave immediately (a very rare privilege in the Japanese army), he was given any special foods he wished, he was encouraged to indulge himself sexually, and was allowed within limits to choose the time of his death by naming the time of his mission. Contrary to popular opinion, the morale of the kamikaze pilots was bad. After the enjoyment of their special privileges there were many excuses and attempts to get out of the final death mission.

U.S. Navy.—To select the best qualified men for the various types of naval training and to evaluate the training itself was a large-scale research operation involving con-

stant test revision as the measures proved valid in varying degrees against actual success in training and on the job. This operation was the responsibility of the test and research section of the bureau of naval personnel. The section developed a basic test battery which was administered to about 2,000,000 men. In addition, it constructed achievement examinations for the navy schools, and tests for the selection and classification of officers.

Clinical psychologists in the navy, numbering about 100, worked under the neuropsychiatric section of the bureau of medicine and surgery. They were assigned to training-station selection units, naval hospitals, precommissioning ships, receiving ships, embarkation centres, disciplinary activities and retraining programs. Psychologists functioned both as independent examiners and as consultants to the psychiatrists but under their direction.

The bureau of medicine and surgery commissioned another 100 psychologists for the naval aviation program. These aviation psychologists performed a variety of functions. In the field service organization they administered tests, did general and psychological counselling with cadets, and helped to standardize flight instruction. In the procurement and personnel organization they also functioned in an all-around capacity as well as test administrators. They contributed at many boards to making the selection-interview a reliable and valid means of evaluation. In the central research group they revised and validated aviation tests.

The navy also gave considerable attention to the problem of the psychological design of equipment and apparatus. At the end of the war a whole section was set up in the naval research laboratories for continuing experimentation on apparatus-design to make for ready learning and optimum efficient use by human beings.

War Agencies.—The selection of agents for the highly difficult and hazardous intelligence work of the Office of Strategic Services (*see* WAR AND DEFENSE AGENCIES) was a major undertaking. Leading psychologists and psychiatrists were called in to aid in the selection and training of personnel. The testing situations devised marked a radical departure from traditional psychometrics. The total person was studied in life situations. Candidates, for example, upon reporting to assessment camps had to live there for several days under assumed identities, with complete loss of former social status, and with no knowledge of the extent to which problem-situations were staged. In addition to the assessment of candidates OSS utilized psychologists in the analysis of intelligence materials.

In the Office of War Information (*see* WAR AND DEFENSE AGENCIES), the main function of psychologists was the systematic evaluation of the effectiveness of the organizations informational programs and an analysis of any intelligence materials of value in the planning of these programs.

Both the surveys division of OWI and the program surveys division of the department of agriculture undertook social surveys for other government agencies to aid them in their administrative problems by this type of grass-roots research. For example, studies were made of industrial morale in the shipyards and in other war industries for the war department and for the War Production Board. Results showed that morale and production could be kept at a high pitch in spite of congested living conditions in a mushrooming war community, if the in-plant conditions of work were favourable.

Related to this type of attitudinal research was the work

of psychologists in the Office of Civilian Requirements of the War Production Board. The problem here was the programming of production of just enough essential civilian goods to keep the domestic economy functioning. O.C.R. conducted its own surveys under the direction of psychologists to obtain estimates of the available goods in consumer's homes and of consumer needs.

In the fall of 1944 an authoritative civilian survey was set up in the office of the secretary of war to make an objective evaluation of the effects of strategic bombing upon Germany. The purpose was threefold; to assess the importance of strategic bombing as against other weapons, to advise the joint target group in the air war against Japan, and to see what lessons could be learned about defenses against bombing. Social psychologists were recruited for the morale division of the survey to determine how the capacity and the will of the German people to resist was affected by bombing. Preliminary studies were made in the spring of 1945 of captured German mail, of German prisoners of war, French escapees and civilians in captured German towns. For purposes of the final study, conducted in June and July 1945, Germany was divided into city groups on the basis of bomb damage, from unbombed to heavily bombed cities. Cross sections of the populations were interviewed in these areas, official German intelligence reports on morale were consulted, and displaced Russians, Poles and Italians were questioned. Since the extent of bombing was already established, the interview schedule with German civilians did not ask directly about the effects of bombing but asked about many aspects of morale. The relative level of morale in areas undergoing different amounts of bombing could then be ascertained without being affected by respondent co-operation. The results showed little confirmation of the belief that bombing strengthened morale. The German will to win was seriously depressed by the heavy air attacks, and the majority of German civilians were ready to surrender long before the end.

They remained in the war because of repressive nazi controls and because of lack of revolutionary initiative among the German people. The findings indicated, however, that continued heavy bombing did not bring successive decrements of morale. After a few raids, people became wholly concerned with problems of fox-hole existence and grew politically apathetic. German industrial morale also declined under bombing but production was maintained for a long time by nazi penalties, rewards and countermeasures.

By the fall of 1944, however, bad cracks appeared in the structure and in a few months the collapse was complete. (See also MEDICINE; PSYCHIATRY; PSYCHOLOGICAL WARFARE; SOCIOLOGY.)

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Psychosomatic Medicine

See MEDICINE.

Public Assistance

See CHILD WELFARE; RELIEF; SOCIAL SECURITY.

Public Buildings Administration

See FEDERAL WORKS AGENCY.

Public Health Engineering

Water Supply.—The problems of water supply during the decade 1937–46 were dominated to a considerable extent by the preparations for and the experiences during war. Developments for the most part centred around emergency conditions. Special field equipment and practices arose in order to prevent or to correct the disorganizations under war conditions. Unusual amounts of water were provided in most war-torn countries for fire-fighting purposes, and severe interruption or complete elimination of services resulted from the destruction of dams, pumping stations and distributing lines.

Complete destruction of one of the largest rapid sand water filtration plants in Europe occurred in Warsaw, Poland, paralleled by the destruction of the great Tirso Power dam in Sardinia, Italy, and by the subsequent destruction of power and water dams in Germany. Events such as these led, however, to the development of extensive emergency programs and of standardized units, capable of rapid application to emergency conditions. These ingenious programs, covering everything from provisions of power facilities, treatment devices and distribution facilities marked one of the high spots in war emergency undertakings.

Civilian defense authorities in the United States provided for similar possible emergency conditions. Much time, energy and money were expended in extra precautions for the operation of key sources of supply. In some instances duplication of plant and equipment was provided, and important advances were made in interconnection between the water systems of adjacent municipalities.

One of the important general projects throughout the world was the provision of increased sources of water, primarily to meet the unprecedented demands of war industries. Although these demands were concomitant with decreased availabilities of construction materials, the situations were met, and even in devastated areas water supply interruption was remarkably limited. The experience of Coventry, England was illustrative of this fact.

In the U.S., developments of sources of water supply progressively farther from distribution centres became essential to meet the increased demands. Large and extensive works were undertaken and partly completed in such major urban areas as New York City, Los Angeles, Boston and Denver. The largest filtration plant in the world was completed in Chicago, Illinois.

Expediency controlled adherence to lower standards of hygienic quality of water in many countries. In spite of these concessions to disaster, however, remarkably few water-borne epidemics occurred throughout the world. Many thousands of cases of enteric disturbance of water-borne origin did occur, however, through the collapse of supervisory functions and the introduction of unusual hazards in cross connections between potable and non-potable water supplies. Large as these numbers were, they were intermittent in occurrence, widely distributed geographically and remarkably few considering the unusual conditions of stress under which most waterworks systems operated.

The London Metropolitan Water board, for example, reported shortly before the end of World War II that there had not been a single case of water-borne infection

following air raids in their jurisdiction—a truly remarkable demonstration of administrative efficiency and responsibility.

Relatively little destruction of plants and structures occurred through sabotage. Contamination of water supplies by aerial attack was virtually unknown. Neither chemical nor bacterial contamination of water supplies was practised, even though precautions for meeting such contingencies were developed in almost every country.

Although there was some evidence that contaminated drinking water might be a means of communicating poliomyelitis, most authoritative epidemiological data did not verify this hypothetical possibility. It was demonstrated, however, that the gastrointestinal tract is a possible source of poliomyelitis from the human body. The active virus of this disease was recovered from the stools of patients and from city sewage.

Furthermore it was disconcerting to find that the virus lives in sewage for a considerable time and in pure water for at least 100 days, and that ordinary processes of water purification do not destroy the virus completely. A great deal more work remained to be done, however, before it could be said that water was an important vector for poliomyelitis. (See also INFANTILE PARALYSIS.)

The relationship of fluorine in water supplies to protective action against dental caries in certain young age groups was given a great deal of attention during the decade. It was reasonably demonstrated that an inverse relationship exists between the prevalence of dental caries and the fluorine concentration of municipal water supplies. A sufficient amount of study was devoted to this problem to lead to the reinforcement of domestic water supplies with sodium fluoride so as to bring the fluorine concentration to a figure exceeding 1.0 p.p.m. (parts per million). It was generally accepted by most investigators that water supplies with fluorine concentrations of less than 0.5 p.p.m. create serious disabilities.

Full plant scale applications of sodium fluoride to the public water supply were carried out with parallel control undertakings in Kingston and Newburgh in New York state; Brantford, Ontario, Canada; Grand Rapids and Muskegon, Michigan and in several cities in Texas. Simultaneously, many thousands of school children were examined annually to determine the variations in their dental condition during their school period and in relation to the fluorine concentrations of the water supplies. (See also DENTISTRY.)

World War II naturally intensified the necessity for developing important techniques and equipments for water treatment in both stationary and mobile field undertakings. Both the army and the navy used diatomite water filters on a limited scale, since they were effective in the removal of causative organisms of amoebic dysentery and of schistosomiasis. Toward the end of the war, new chemical derivatives were developed for field use as superior substitutes for the generally used chlorine compounds. Many of these were iodine organic compounds in which the iodine was loosely held and readily available for bactericidal and cysticidal activities.

Epidemics of infectious hepatitis which occurred in various parts of the world appeared to have their origin in sewage-polluted waters. In many instances they were attributed to gross sewage pollution of unprotected surface and underground waters. Heavy chlorination of water seemed to provide adequate protection against the virus of this disease.

Heavily polluted underground waters were under additional suspicion as causing the death of infants. This

was one of the few examples of the possible detrimental effect of high chemical concentration of nitrate compounds in heavily polluted farmyard wells. Such high nitrate-containing waters, when ingested by infants, resulted in the production of nitrites through the bacterial action. The nitrite ion was absorbed and oxidized the haemoglobin of these children to methaemoglobin with resulting cyanosis, and death.

Synthetic ion-exchange resins reached such a high state of development and use that they were applied to large scale central demineralization units for water supply, particularly in industrial plants. These new procedures resulted in the availability of a purer water at a lower cost than was formerly produced through distillation.

Cathodic protection of metal structures for corrosion control provided an additional medium for meeting this great plague of water-supply structures. The application of sodium hexametaphosphate in dosages as low as 2 p.p.m. added to the available measures in this same field of anti-corrosion activity.

Sewage Treatment.—No startling developments were reportable in this field during the decade. Biological processes were still being less favoured than those with a chemical and mechanical means of treating sewage. The handling of sewage sludge passed into the field of vacuum filtration followed by either incineration or drying. The Chicago Sanitary district exemplified one of the largest installations of the combination of vacuum filtration and drying.

In spite of the general trend toward mechanical operations in the U.S., the more complete bio-oxidation processes appeared to be favoured in Great Britain and on the continent, with the completion of the great works of the West Middlesex Main Drainage program at Mogden, serving more than 1,000,000 people.

Increasing use of sludge gas for power was evident in some 150 installations of gas driven engines in the U.S. alone during the decade.

Air Sanitation.—Complete agreement was not reached during the decade on this very significant problem of public health engineering. A great deal of information, experimental and practical, of course, had been acquired on the manner of formation of droplet nuclei; the rate of settling of such materials; the longevity and virulence of air-borne pathogenic organisms; and the destruction or removal of such organisms by ventilation, air filters, aerosols, ultraviolet light, treatment of bed clothes and of floors.

In spite of these extensive studies, however, general agreement on the significance of air-borne infection control was not reached. The public health significance of this mode of transmission of contagious diseases, especially those of the respiratory tract, was still being debated, and activity still proceeded on many fronts in further refined studies of each of the aspects enumerated above. Military and civilian experiments of elaborate character were actually used in connection with activities on the war and home fronts.

Improvements were made in the use of aerosol, vapour or mist disinfectants sprayed into the room. Ultraviolet light was used in large scale experimental studies. They all disclosed that many of the available materials and devices are capable of reducing materially the bacteria in the air. Much of the bacteria density in the air, however, apparently resulted from blankets, bed linens and the floors of sleeping and living quarters. These findings in

turn led to intensive studies on the use of various impregnating oils to be incorporated into bed clothes, in the laundering processes and to be applied on the floors for the settling of dust.

Two major questions in this new field of environmental sanitation still remained unanswered. They were: (a) where and under what conditions is droplet infection sufficiently important to warrant control; and (b) what methods are most effective and economical.

To say that both of these questions still remained unanswered is not to discount the fact that a new field of environmental sanitation of major importance to human health and welfare was opened during the 10-year period.

Refuse Disposal.—Two trends-marked developments in the field of disposal of garbage and rubbish. High temperature-destruction of these materials was the first; in the U.S. the construction of new incinerators for this purpose made great strides. The second development was in supervised land-fill as an economical and sanitary method of disposal of refuse. Operations in New York city, San Francisco, Detroit, Baltimore, and in many undertakings of Great Britain, all demonstrated that land-fill procedures, conscientiously supervised and administered, were cheap, sanitary and effective.

The grinding of garbage, both on the household and on the community basis, was also introduced into common practice. St. Louis, Mo., for example, disposed of an average of 400 to 500 tons of refuse daily by fine grinding and discharge into the Mississippi river.

Disposal of garbage jointly with sewage was practised in Gary, Ind.; Lansing, Mich.; Rock Island, Ill.; Findlay, O.; Goshen, N.Y., and Marion, Ind. Although such methods produced an increased loading on the sewage treatment processes, this fact was not found to be a major deterrent, if adequate provision was made for such increased loads.

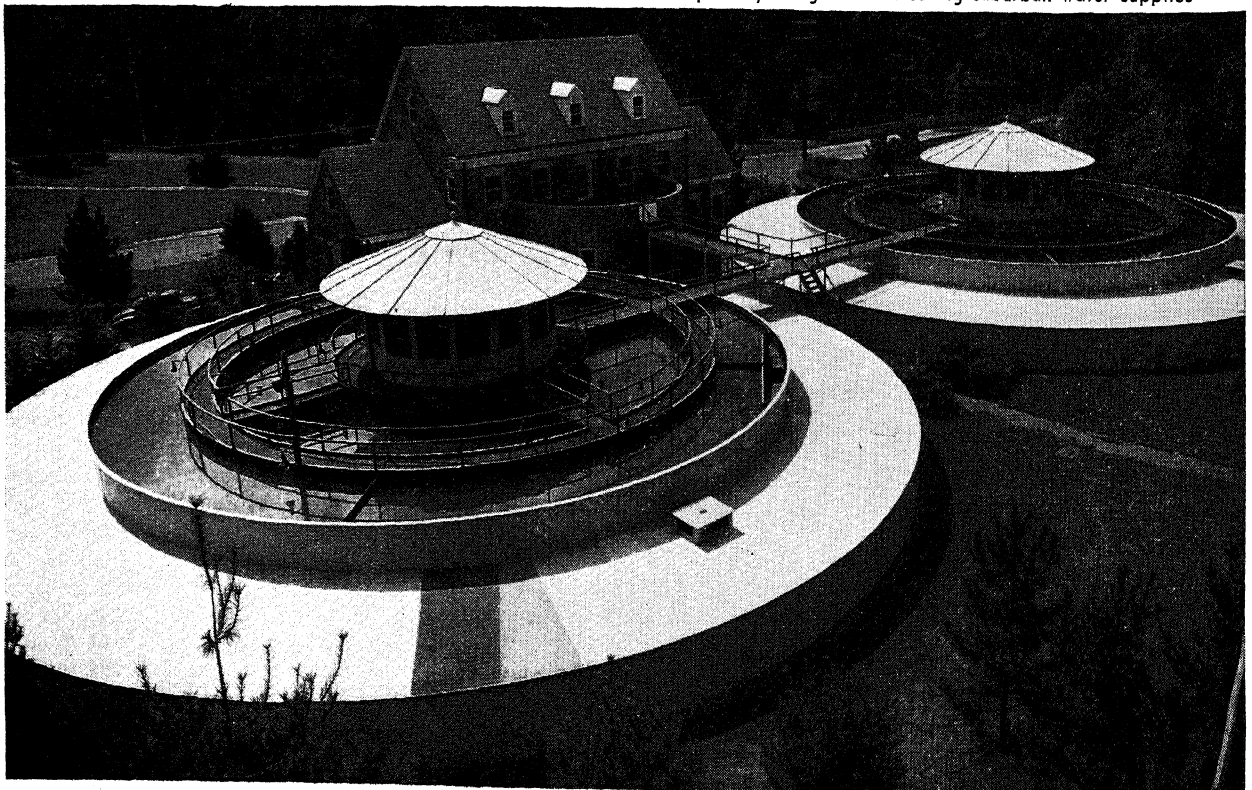
The household garbage grinder represented one of the major advances in the handling of garbage on private premises. It eliminated the objectionable collection can and the equally objectionable collection by trucks.

Insect Control.—The diseases caused by mosquitoes, flies, cockroaches, fleas, lice, mites and other insects represent the largest category of hazards to health in the world. The great scourges of malaria, typhus, bubonic plague and dengue fever again demonstrated their public health importance with renewed vigour during the 10 years. Fortunately, the same period witnessed outstanding contributions to the control of disease in the development and use of DDT or dichloro-diphenyl-trichloroethane; of insect repellents; and of the "building out" of mosquito-breeding areas of large size. The latter procedure was eminently successful in the work performed on the impounding reservoirs of the Tennessee River valley, perhaps the largest demonstration in the world of this successful type of permanent elimination of mosquito-breeding areas. Although the discovery of DDT was not properly to be allocated to the period 1937-46, since it was first synthesized during the 19th century in Germany, its rediscovery and its application in 1940 to the potato crop in Switzerland revived and extended universal interest in it.

Although much work still remained to be done with respect to the comprehensive applications of DDT, there was little reason to doubt that the fields of application for public health purposes as well as for improving the agricultural economy had by no means been exhausted. It lent itself to application by aeroplane dispersion and by spraying on the walls of houses, thus extending its successful use with constantly diminishing costs. The prospect for reducing materially and economically the insect-borne diseases throughout the world was promising. (See also ENTOMOLOGY.)

Rodenticides.—Rodents, as reservoirs of diseases affecting

Purification plant built at Reelfoot lake, Tenn., with equipment specially designed for treating suburban water supplies



man and as predatory animals, had resisted control for centuries. In this activity, again, war-created shortages of chemicals formerly used as rodenticides, actually pressed forward the search for substitutes or better chemical compounds for these purposes. Two effective materials developed during the decade gave promise of superseding the more familiar conventional ones of the past. Sodium fluoracetate or "1080," and alpha-naphthyl thiourea or ANTU, were promising compounds of this period. Both were highly toxic, stable, dependable and acceptable to rats and perhaps to many other rodents.

Housing.—Throughout the world, the 10-year period saw a more complete deterioration in housing facilities than perhaps any previous period within a century. Aside from the fact that destruction of houses by deliberate intent exceeded any known in history, the period was paralleled by almost complete absence of the construction of new and permanent houses. The 10-year interval, therefore, measured a declining availability of facilities for living. Energy was directed primarily at continuing the studies on the hygiene of housing, pre-eminently through the Committee on the Hygiene of Housing of the American Public Health Association. Data were made available on the technique of evaluating housing facilities with particular reference to living space, sanitary facilities, light and air. Detailed guides were thus prepared for the determination of the quality of existing or proposed housing, so that investigators might have objective criteria by which to plan and to evaluate their programs.

No major progress could be reported in urban redevelopment programs, although permissive legislation for such redevelopment was enacted in a number of the cities of the United States. The only major demonstration, however, of the application of such legislative measures was in the Metropolitan Life Insurance project in New York city. Its significance in reducing blighted areas through private investment remained to be demonstrated and evaluated. In continental Europe and in the eastern countries many factors of war prevented anything more than thoughtful planning for the future. (See also EPIDEMICS AND PUBLIC HEALTH CONTROL; HOUSING; TOWN AND REGIONAL PLANNING.)

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Public Health Service

See DIETETICS; FEDERAL SECURITY AGENCY; HOSPITALS; VENEREAL DISEASES.

Public Housing Authority, Federal

See HOUSING.

Public Libraries

See LIBRARIES; SOCIETIES AND ASSOCIATIONS.

Public Opinion Surveys

The history of public opinion surveys of the representative sample type coincided closely with the decade 1937–46. The *Fortune* Survey of Public Opinion and the American Institute of Public Opinion releases had first been published in 1935. The British Institute of Public Opinion began publication in 1936, followed soon by Mass Observation. Similar "polls," as they were popularly named, were established in Canada in 1941, in Australia in 1941, in Sweden in 1942. After the end of World War II in 1945, polls were established in France, Italy, Norway and several other countries. By late 1946, most of the world's population outside of Asia, Africa and Eastern Europe was represented by some sort of poll, public or private, regular or intermittent. Because of these polls it became possible to measure the history of the decade in many countries of the world in a manner in which no previous decade of human history had ever been measured before.

A complete measurement by these means, however, remained a possibility only. Most of the published polls were undertaken for journalistic purposes, and many of these for the purpose of estimating the election strength of various political candidates. Thus, although an estimated total of some 50,000 questions were asked by the major polling agencies in the U.S. alone and many thousands more in other countries, the interest of the agencies was mainly in current news. Social scientists and historians made no comprehensive synthesis of the mass of data accumulated. Reliance must therefore be put on the occasional and partial recapitulations made by the polling agencies themselves. From these summaries certain conclusions were drawn concerning the trends of public opinion and the ways in which public opinion is formed. The more significant of the findings so established are outlined in the following paragraphs.

The "New Deal."—The start of polling revealed that the people of the U.S. by a majority of about two-thirds were in favour of having the federal government take the ultimate responsibility for seeing to it that all who were willing and able to work had jobs. This opinion reversed what was believed to be the traditional U.S. attitude toward government participation in economic affairs and constituted an endorsement of the economic responsibility which the Roosevelt administration had assumed. Majorities of the public continued to favour most of the principal administration measures with the exception of the effort to revise the terms on which the justices of the supreme court held their offices.

Public approval of the New Deal program, including its labour legislation, carried through the war period and into the postwar reconversion, and was sustained in the face of strikes and other economic disturbances. As early as 1938, however, it became apparent that the public was tiring of those who had initiated and administered the program. The polls indicated, as clearly as it was possible to indicate a historical hypothesis, that Roosevelt would not have been elected to a third term if the war emergency had not arisen. After the war and Roosevelt's death, the delayed reaction in favour of the Republican party took place. But there was no indication that the people in changing leadership were abandoning support of the New Deal program.

British Resistance.—Mass observation, using standard polling methods and several variants thereof, investigated the British public's reaction to many wartime meas-

ures. One variant, a sample count of civilians carrying gas-masks as requested by the government, revealed the progressive steadying of British nerves as the war went on. When war was declared in Sept. 1939, a high percentage of civilians carried gasmasks. The percentage dropped off sharply during the winter, to rise again with the fall of France. At the start of the battle of Britain it rose once more, but not so high as it had previously. It soon dropped to a negligible percentage and remained there even when the German attack on the U.S.S.R. was announced.

U.S. "Road to War."—When Germany attacked Poland in 1939, U.S. newspaper editorials for a period of several weeks seemed to be written on the assumption that the U.S. would soon be at war with Germany. A majority of the public did not take this view. While accepting the possibility of war, they hoped to avoid it for as long as possible. They sidled toward war in a series of steps, all short of war. Public opinion first approved revision of the Neutrality act to a "cash and carry" basis. When it became clear that British cash would not be sufficient for war purchases, the public approved lend-lease. When it became likely that deliveries could not be made without the help of the U.S. navy, the public approved convoying. Asked first whether convoying should be undertaken to get goods to Britain, a majority said "yes." Asked then if a U.S. naval vessel were to be sunk in convoy work, should the U.S. go to war, a majority said "no."

During the same period, the U.S. public gave up its feeling of geographical isolation. Before the war a majority of the public was unwilling to defend even Central America against foreign attack. Only a bare majority was willing to defend Hawaii. After war began in Europe, a majority became willing to defend South America down to the "hump" of Brazil. As war progressed, the ramparts were stretched farther and farther out both on the Atlantic and the Pacific sides. Just before Pearl Harbor was attacked, a majority was willing to defend Australia and the Netherlands Indies to the west, Britain and West Africa to the east. The sense of belonging to the world, thus established, persisted during the period of U.S. participation in the war and during the period immediately following. All polls showed the U.S. public in favour of taking active part in some sort of world organization.

Event vs. Argument.—One of the chief findings of the polls concerning opinion formation was their demonstration of the relative ineffectualness of argument and persuasion. It was long suspected that newspaper editorials did not win elections, but careful polling showed that the whole apparatus of the political campaign achieved hardly anything in swaying votes; it merely helped to get the votes out by arousing interest. Public opinion, in fact, was shown to be not fickle, but remarkably stable. This stability was somewhat obscured by the journalistic pressure on the polls to follow the news. Therefore, most polling continued to be done in those areas where opinion was in the process of formation or was being changed by events. Events measurably change public opinion. Each step in the "road to war" described above was taken in response to events. But where events were minor or did not appreciably affect the situation concerning which an opinion had been formed, then public opinion scarcely moved from year to year, no matter what arguments were presented.

Opinion and Information.—Another basic finding of the polls concerned the relation of opinion to information. People who are well educated and well-to-do economically

are usually well informed also. Of these three correlated criteria, information seems to have most to do with the character and range of opinions held. In general, those who are well informed on current affairs hold definite opinions on a greater number of topics than do those who are poorly informed. The well informed also tend to hold moderate opinions on the topics they have considered, whereas the poorly informed tend to hold more extreme opinions. If democratic government depends for its effectiveness on a wide spread of moderate opinions, and if few and violent opinions are prejudicial to it, then the democratic faith in education, information and economic competence had been demonstrated to be sound by scientific polling methods. (See also PSYCHOLOGY.)

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Public Relations

The growing complexity of society made all groups increasingly aware of their dependence on public approval. The great changes which took place after World War I in the social, political, economic, technological and psychological aspects of society led to intensified insecurity, group alignments and disparities. Such developments made it essential to establish methods whereby groups might adjust to change and become integrated with life's changing patterns.

Public relations became a recognized profession and tool of integration between 1937 and 1946. In 1937, the depression psychology of business and other social forces was giving way to confidence. Shortly thereafter, the impending war changed public psychology. In 1940, the United States became a public relations battleground for conflicting ideologies, with broad issues displacing sectional problems as the public's main interest. Public relations turned to strengthening democracy.

From 1941-45, U.S. public relations efforts were devoted almost exclusively to the war program. With hostilities' end in 1945, it was obvious that the U.S. was to go through a period of difficult adjustments. A contest took place among all groups to improve their positions with the public.

In 1937, the government made little distinction between publicity, public information and public relations. From 1941 to 1945, the government organized large public relations departments. The Office of War Information, a giant public relations service, had a peak wartime personnel of 5,693.

The public relations efforts of the U.S. army and navy stressed the building of morale among civilians, workers and the armed services, strengthening good-will with the United States' allies, winning over the neutrals and defeating the axis.

The year 1946 found public relations entrenched as a function in government. Research of public attitudes, distribution of readable information and co-operation with media, became standard practice. The U.S. budget bureau in 1946 reported that government publicity costs amounted to \$75,000,000 during the fiscal year. Employees on full-time numbered 23,000; 22,769 were engaged part of the year.

Diversity of Users.—Public relations achieved new and enlarged status in industry. Public relations experts became high officers of corporations. Some headed trade and professional organizations. Businesses added and expanded their public relations departments with responsible directors at the head. Advertising agencies expanded their

public relations departments. The National Association of Manufacturers, the U.S. Chamber of Commerce, the American Association of Advertising Agencies, the Association of National Advertisers and many other trade associations and individual organizations undertook public relations activities. Labour expanded its public relations effort to build good-will with the public.

The great media—press and radio—became aware of public relations as a tool of management and discussed the subject with growing understanding. Advertising was used to sell business as an institution to the public. State publishers' associations and individual newspapers engaged in public relations activities. As an example, the National Association of Broadcasters adopted a code of fair practice in 1939-40.

Organized social service adopted public relations procedures, as did minority groups—racial, religious and political—to advance their causes.

Education emphasized the importance of public relations. The National Education association adopted a broad public relations program carrying on activity to improve the whole educational field with the public.

The first course on public relations was given at New York university in 1923. In 1937, 68 such courses were given at U.S. universities. The 1946 bulletin of New York's New School for Social Research, listing 11 courses, was typical of the academic approach. The first workshop in public relations was held in Oct. 1945, at the California Labor school in San Francisco. Universities extended frequent lecture invitations to public relations practitioners. Study of this field was an adjunct to courses on political economy, sociology and social psychology. Many universities had employed directors and departments of public relations.

Artists made similar determined public relations efforts to stimulate public understanding and interest in art.

Rise of Publicists.—The number of independent public relations counsel multiplied during this decade. In 1937 the New York classified telephone directory listed only 36 public relations counsel; in 1946 there were 219. In Chicago the increase in the same period was from 9 to 68. Los Angeles in 1946 listed 30; Washington, D.C., 25. The magazine *Advertising Age* estimated that, in 1946, the 20 top publicists in New York and Chicago shared total fees in excess of \$3,000,000 yearly.

The first *Public Relations Directory and Yearbook*, issued in 1945, listed 455 independent practitioners in 65 cities and 24 states; 3,870 business firms employing public relations directors; 1,216 trade and professional groups, and 588 social service, religious and other nonprofit organizations doing public relations work.

During this period, public relations groups were organized on geographical, trade and professional lines. The American College Public Relations association membership grew from 302 in 1937 to 518 in 1946; National Publicity Council for Health and Welfare Services increased from 1,200 to 2,000; the Library Public Relations council, from 6 in Jan. 1939 to 210 in 1946. Among other groups were the Publicity Club of New York, Publicity Club of Chicago, Fifty Club of Philadelphia, and Public Relations Group of Los Angeles. The National Association of Public Relations Counsel, Inc., organized in 1936, 10 years later had 345 members in 30 cities and 14 states; the American Council on Public Relations, American Public Relations association, American Trade Association Executives and other groups had entered the field.

Publications.—Special periodicals were established to deal with public relations. *The Public Opinion Quarterly*,

published by Princeton university, was established in 1934; *Channels*, published by the National Publicity Council for Health and Welfare Services, in 1938; and *Publicity Problems and Publicity Digest* by the American College Publicity association, in 1942. *Public Relations News*, a four-page leaflet, was issued weekly.

The American Journal of Sociology, *The Journal of Social Psychology*, *The Journal of Social Issues*, and other periodicals continued to discuss public relations. *Tide*, *Printers' Ink*, *Sales Management*, *Advertising and Selling*, and *Advertising Age*, trade papers in the sales and advertising field, devoted substantial space to the subject.

Learned and professional societies' publications recognized public relations. *Propaganda and Pressure Groups* was published by the American Academy of Political and Social Science in 1935.

The Society for the Psychological Study of Social Issues, American Marketing society, American Sociological society, American Association for Adult Education, American Political Science association and Social Science Research council covered aspects of public relations in their researches and reports.

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Public Roads Administration

See FEDERAL WORKS AGENCY; ROADS AND HIGHWAYS.

Public Utilities

The decade ending with 1946 was as eventful a period as any in the history of U.S. public utilities. The first half was dominated by the New Deal legislation as that congeries of measures sought to overcome the accumulating difficulties of public utility control made manifest during the depression beginning in 1929. The last half brought the overshadowing importance of another world war, in consequence of which public utility plants were put through the strains of serving the needs of a war economy with the objectives of the New Deal reforms only partially achieved.

Developments in Regulation.—After World War I, economic and technical conditions were favourable for a rapid expansion in the public utility plant of the United States and in the extension of service. In the course of the 1920s, this involved much corporate reorganization, with the business becoming more and more interstate in character. Even before the depression, state regulatory commissions felt that they were without sufficient powers to deal with the widespread and interwoven corporate structure of the electric, gas and communications industries. Under the leadership of New York and Wisconsin, a number of states, after investigation of conditions, made extensive commission reorganizations in an effort to meet the changes which had occurred in these regulated industries. The adequacy of this reoriented state regulation to protect consumer interests without aid from federal agencies was, to say the least, debatable.

The depression focused public interest upon the expanded character of the utility industries and especially upon the abuses associated with holding companies and their security issues. This coincided also with a revival of the movement for the conservation of natural resources. Thus there was widespread political support for a national administration committed to a program of reform and expansion in federal regulation.

The steps taken may be briefly reviewed as follows: (1) Radio broadcasting companies, formerly under the Federal Radio commission of 1926, and interstate telephone and telegraph companies, under the Interstate Commerce commission since 1910, were in 1934 placed under a new Federal Communications commission. (2) Regulation of interstate motor carriers was added to the duties of the Interstate Commerce commission. (3) A Federal Power commission had been set up by the Federal Water Power act of 1920 as a part-time, ex-officio body to administer a system of licensing of water powers on interstate streams and on the public domain. Amendments to this act in 1930 reorganized the commission into a full-time agency. The significant change came with the enactment of title II of the Public Utility act of 1935, which vested in the commission regulation of rates and service of electric utilities in interstate commerce, supervision over mergers, sales or transfers of property, over security issues and over other matters. Where the commission's powers under the act overlapped with those of the state commissions, the latter were accorded a priority of jurisdiction, but the federal agency was instructed to co-operate with the state commissions. In 1938 it was accorded a similar jurisdiction over artificial and natural gas utilities. (4) The Securities and Exchange commission administered three statutes: the Securities act of 1933, a "blue sky" law first administered by the Federal Trade commission; the Securities Exchange act of 1934, which created the commission; and title I of the Public Utilities act of 1935. This act declared that "public utility holding companies and their subsidiary companies are affected with a national public interest" and provided measures designed to give control over their activities, notably security issues and contracts with service companies, the abuses of which had handicapped the regulation of operating utilities because they were outside the reach of state commissions.

The Holding Company Problem.—The public utility holding company problem began with the mushroom growth of these agencies in the 1920s. Once New Jersey had opened the way for its legal existence, the holding company began the process of integration, in the course of which valuable services were rendered to subsidiaries in financing, in the supervision of construction, in the purchase of materials and generally in supplying engineering, managerial and legal counsel. Of the 57 utility holding companies doing business in 1935, fully 41 were chartered between 1922 and 1932.

A prolonged investigation by the Federal Trade commission yielded abundant evidence of the abuses which had crept in along with the sound achievements. In face of the impotence of the state governments to deal with them, and owing to the lack of "arms-length bargaining" between parent and subsidiary, the charges for service performed were generally adjudged excessive, since the test of a freely competitive market was absent. The pyramided holding company exercised an effective if tenuous control over a wide range of operating utilities, building up financial empires which challenged the regulating powers of

government. In the end it was a struggle between the economic power of syndicated capital and the political power of government operating under a federal system. The combination of the principle of trading on the equity (inherent in any corporation which borrows a portion of its capital) with the pyramiding principle of the holding company raised to an even higher power the capacity of the ultimately controlling equity to enhance its earning capacity. When the depression which began in 1929 cut down the earnings of the underlying operating companies, the essential financial weakness of pyramided finance capital was progressively revealed. It ended in widespread bankruptcies of holding companies and financial distress of their security holders.

The unregulated issuance of holding company securities made a mockery of the regulated issuance of operating company securities, to the extent to which such regulation had been carried by the states. Lack of uniform accounting and of accounting control rendered investment markets less efficient in the pricing function, if indeed these markets had not been deliberately rigged by fictitious purchases. Moreover, the lack of control over intercompany transactions made possible the marketing of holding company securities on the basis of fictitious asset values, thus burdening the operating companies with the support of overcapitalized financial structures. And, finally, the scattered and fragmentary holdings of operating companies in many cases brought no gains in managerial efficiency, which was the boast of the better integrated and co-ordinated holding company systems. It was the pressure to sustain a level of earnings to support these overextended financial structures in the face of demands for rate reductions from consumers in the emergency of a deepening depression which ultimately brought on political action in the shape of the federal act of 1935 to regulate the holding company.

In this act, the jurisdiction of congress was grounded upon interstate commerce and upon the use of the mails. A holding company was defined as one which controlled 10% or more of the voting stock of electric and gas utilities. All holding companies coming within the scope of the act were required to register on or before Dec. 1, 1935, with the Securities and Exchange commission (SEC) and to give certain relevant information. Failure to register meant the loss of mailing privileges and of the right to carry on interstate commerce.

In addition, certain specific provisions were included to eliminate designated evils. Henceforth, all holding company securities were subject to SEC control, as were the securities of operating subsidiaries. As to the latter, there were provisions safeguarding the jurisdiction of state commissions. Affiliated service companies were to be dissolved or transmuted into mutual companies. "Upstream loans" were forbidden. Intercompany transactions in securities and properties were subjected to commission control, as were interlocking directorates and officers. Pyramiding was limited to three tiers of companies (the grandfather clause) and the corporate structure was to be simplified, with voting power equitably distributed. The so-called "death sentence" provision made it the duty of the commission, as soon as was practicable after Jan. 1, 1938, to limit the operations of holding companies to a single integrated public utility system of functionally related properties. The passage of the act was followed by a sit-down strike of the holding companies which refused to register until the first constitutional test of the act in the Electric Bond and Share case in 1938. The defendant company denied the validity of the registration provision and sought a

declaratory judgment that the entire act was invalid.

The decision upheld the power of congress to require holding companies to register and to furnish the information required by the commission. The court also refused to render a declaratory judgment on the constitutionality of the act as a whole. On the other hand it sustained the position of the commission that, since the act provided for separability so that the invalidity of a part of the act would not render the whole invalid, the companies were free to challenge the remainder of the act when the commission's orders actually affected their interests. In short, the favourable decision overcame the reluctance of holding companies to register and put the SEC in a position where it could begin its real work of regulating holding companies.

Spurred on to new activity by this decision, the SEC proceeded with plans for seeking a voluntary integration into contiguous geographical units to facilitate the economies and improvements of service resulting from interconnection. Tentative plans were submitted by most of them. It was noticeable that companies were moving voluntarily toward simplification of corporate structures through the elimination of intermediate holding companies and toward the elimination of interlocking directorates. In the end, however, the results from these voluntary efforts proved to be disappointingly meagre. Accordingly, early in 1940, the SEC began its long-awaited action by issuing "show cause orders." Nine of the larger holding companies were required to file statements and plans as to their position and the steps to be taken in conforming to the provisions of the act. As stated, these limited operations to "a single integrated public utility system and to such other businesses as are reasonably incidental or economically necessary or appropriate to the operation of such integrated public utility system."

Corporate assets involved in these activities were estimated to exceed \$14,000,000,000. It was certain that these efforts on the part of the commission to make headway on its most important and difficult assignment would provide grist for its administrative mill for years to come. The details to be encompassed were technical in an engineering, legal and financial sense; they were individual to each property and the result of historical growth; they could be ascertained only upon painstaking investigation, because the facts were often obscure and their economic implications in relation to the legislative standard imposed were only dimly perceived by those who drafted the law and by its legislative sponsors. If the sprawling holding company systems operating through many states were to receive permission to operate more than one integrated system, they must be prepared to show that each additional system could not be operated as an independent system without loss of substantial economies, and that their common control did not impair localized management or the effectiveness of regulation. It was certain that the task would prove a severe test of the efficacy of the administrative machinery.

This outstanding issue of public policy finally came to a head when the North American Co. challenged the commission order directing the company to divest itself of all its other properties except those of its direct subsidiary, Union Electric company of Missouri. These properties were located in and around St. Louis, Mo., and in contiguous portions of Illinois and Iowa. The courts' answer to this challenge, in a long-delayed decision given in 1946, was unanimous and unequivocal. It declared that such regulation fell within the power of congress over interstate commerce and that the order did not violate

the due process clause of the 5th amendment. Since section 11b was the heart of holding company regulation, the SEC by this decision was given the green light to go ahead with its work.

Wartime Regulation of Utilities.—Regulation of U.S. public utilities during World War II fell into two periods: one beginning on May 29, 1940, with the Office of Production Management as the controlling agency, and a second beginning with the outbreak of war, under the general control of the War Production board.

The OPM operated through a Defense Communications board, a transportation division, a Heat, Light and Power division, the Federal Power commission, the Supply Priorities and Allocation board, and the Office of Petroleum Coordinator for National Defense. The major purpose of these agencies was to maintain contact with the war and navy departments, the maritime commission and all vital defense industries in order to translate their needs into public utility demands. In this connection it was important that the requirements in any area be anticipated and that steps be taken to meet them promptly. It was necessary to plan in co-operation with state and federal regulatory authority and with the utility industry for the most economical use of existing utility capacity, curtailment of civilian demands, emergency interconnections between systems and expansion of facilities. Where utilities were unable or unwilling to undertake the necessary construction, special arrangements were to be made through the president to finance or otherwise further such construction.

The same aims dominated the control exercised by the WPB. The agencies were reshuffled through the creation of the Office of War Utilities. In it a power division had jurisdiction over elective power, central steam heating and the production of power equipment. A communications division had jurisdiction over telephone, telegraph and cable utilities and the production of wire communication equipment. A gas division controlled natural and manufactured gas utilities and gas transmission lines, and a water division supervised water utilities. The significance of this regulation appeared from the fact that manufacture of a ton of aluminum required 20,000 kw.hr. of electricity, a ton of steel needed 14,000 gal. of water, the manufacture of a medium tank used 5,000,000 cu.ft. of gas, and the construction of a Victory ship required 63,000 telephone calls.

Regulatory procedure involved the issuing of general orders carrying the signature of the chairman of the War Production board and controlling the relevant activities of utilities affected. Administrative letters were used in interpreting and amending orders. By framing the initial orders in very general terms and modifying them by interpretations and amendments, the board kept control of ultimate decisions which could thus be adjusted to the trend of the war. In general, utilities were required to get authorizations before expanding their facilities. With the wartime demands for utility services, these facilities were used to full capacity and sometimes, especially in the case of electric power facilities, to the extent of overloading their rated capacity. The allocations and priority designations in the use of scarce war materials, especially steel, copper and aluminum, were accomplished through a system of certification.

At the peak of the war effort, U.S. power output had been increased by 69%, while installed generating capacity was increased by only 22%. This was reflected in a parallel

increase of the average annual plant capacity factor from 36.9% to 51.1%. Similar results were achieved in the use of gas, water and telecommunications services.

Another important means of meeting the emergency of around-the-clock operations was by expanding service interconnections where these were possible, thereby affecting an exchange of service so that work stoppages from breakdown in machinery could be prevented. In part the new construction was necessary to alleviate the hazard of numerous breakdowns of machinery caused by wear and lack of proper maintenance. The end of World War II made possible a speeding-up of the program of replacing the accumulated over-age equipment.

On account of the war emergency, the usual rule under which utilities served all customers was radically modified by the board. Customers engaged in nonessential activities did not need to be served at all, or their service could be curtailed if the additional load created too heavy a burden upon equipment or facilities. New service connections were scrutinized with care, because wire, pipes, poles were in short supply.

In the manufactured gas industry it became necessary, particularly in the east, to conserve gas because of the shortage of coal. Strict conservation programs were ordered into effect by the board in areas designated as critical. To alleviate these shortages, the construction of natural gas pipe lines was authorized, of which the Appalachian pipe line extending from Texas to West Virginia completed in 1944 was the most important. With its 1,200 mi. of 26-in. pipe, this was the longest natural gas line in the world. These emergency constructions were successful in reducing shortages and in bringing about a relaxation of restrictions even before the end of World War II.

During the war, telephone utilities were unable to meet the demand for service. In spite of a threefold increase in the production of communication equipment, the civilian supply was inadequate. Manpower shortages aggravated the problem. With the mass migration of the civilian population and the far-flung distribution of the armed service personnel, an unprecedented demand for toll service was created. Some new construction was authorized by the communications divisions to provide additional channels for toll messages with a minimum expenditure of critical materials. The use of coaxial cable, providing many more circuits than an equivalent amount of materials used in ordinary cable construction, was important in this connection. It was in local exchange service, therefore, that there was the largest backlog of unsatisfied demand at the close of the war. (See also TELEPHONE.)

On the whole, the 13,000 water utilities serving about 85,000,000 people came through the war period with the least strain on their facilities. Here and there, particularly in large metropolitan centres like New York city, N.Y., Philadelphia, Pa., Los Angeles, Calif., and San Diego, Calif., critical shortages developed which were alleviated by authorized expansion in facilities. Water shortages were not generally susceptible of correction by interconnection. Only an expansion in primary supply or in storage facilities could be of genuine help. To this end, more concrete storage tanks were authorized instead of steel tanks, and an extensive campaign of voluntary water conservation was initiated, particularly in the reduction of waste from some 150,000,000 leaking water fixtures.

Similar voluntary conservation campaigns were carried out by the telephone and electric power industries. These

endeavours were supplemented by conservation orders such as the "brownout" put into effect from Jan. to May 1945. "War time," in effect since Feb. 6, 1942, was calculated to save approximately 1,000,000 tons of coal annually and to make unnecessary the installation of an additional 1,000,000 kw. of new generating capacity.

The WPB thus was able to meet all war requirements without undue hardships upon the civilian population; it received less criticism than other wartime regulating agencies. It began to relax its controls and prepared for its discontinuance by Oct. 1, 1945.

In general, the OPM and WPB supervised the utility industry from the point of view of the supplying of service and the allocation of physical materials. Price rationing was at first left to the normal functioning of the civilian regulating agencies whose co-operation was, of course, freely forthcoming. To extend price rationing and service rationing to the wide field of civilian supply where shortages were critical or impending, congress finally set up the Office of Price Administration. Legislatively, this was the most significant event, for from Oct. 2, 1942, it became the duty of this agency to "aid in stabilizing the cost of living." This was the incidence of OPA's activities upon the utility industries. Legislation placed the OPA in a position where it might influence the rate-making activities of regulating commissions. Under the terms of this act, OPA had to be notified 30 days in advance of a rate proceeding and given an opportunity to intervene in any case involving rate increases by a public carrier or other public utility. This power to intervene was upheld by a U.S. circuit court of appeals in the case of an interstate motor carrier on the ground that the Interstate Commerce act had been superseded "to whatever extent may be necessary to achieve its own purposes."

Early in 1943, with the placing by executive order of local electric railway and motor bus services under the control of the Office of Defense Transportation (already in charge of all forms of interstate transportation) and with the merging of the control of all nontransport utilities under the revised WPB setup, the dual system of wartime regulation under the war powers and of regulation under the police powers and their federal equivalents was simplified.

The most significant single instance of OPA effect on public utility regulation was the reduction in freight rates ordered by the ICC in April 1943. This reduction removed increases of 6% which the commission had granted early in 1942. In carrying out the purposes of the stabilization act of Oct. 1942, the commission found that the passenger rate advances of 10% did not need to be disturbed, and that despite the freight rate decreases the resulting service revenues would be sufficient to meet all costs. Similarly, OPA sought to prevent increases in other public utility prices, especially those which flowed automatically from contractual or technical requirements like the various types of fuel clauses.

In spite of OPA pressure, however, rate increases were granted when it became necessary to provide increased revenues in order to keep up good service. With the close of the war in 1945 and the sloughing off of the powers of OPA in 1946, regulation of utilities once more returned to the civilian agencies. (M. G. G.)

Public Utilities in Other Countries

Electricity.—In Great Britain the year 1937 marked an interesting stage in the story of public electricity supply. A clear decade had then passed since the formation of the Central Electricity board (C.E.B.), late in 1926. In 1927

its program was planned and announced; by 1937 it was practically completed, and the grid, interconnecting the principal generating points of the whole country, had been trading three years and in full operation for a year.

The total output of electricity from public supply stations in 1937 was 22,905,000,000 units. At the end of that year the grid system comprised approximately 4,180 mi. of transmission lines, 2,938 of which operated at 132,000 volts, and the maximum demand on the grid was 5,967,000 kw. The number of selected stations was 137, with a total installed capacity of 7,653,570 kw.

At the close of 1945, the corresponding figures were 5,158 mi. of transmission lines, 3,626 operating at 132,000 volts; there were 142 selected stations with a total installed capacity of almost 11,500,000 kw. Output of public electricity supply in 1945 was 57% higher than in 1938, the last complete year before World War II.

Under the threat of war the C.E.B., as a precautionary measure, prepared a scheme for establishing a reserve of mobile plant, also a "pool" of switchgear, transformers and other equipment which was stored in various places throughout the country. On many occasions apparatus was withdrawn from the pool and made available for temporary use in the prompt restoration of essential supplies.

The six years of war proved to be eventful indeed to the more vulnerable centres of generation, and often, under imminent danger of fire and explosion, supply that had been interrupted was resumed within a matter of hours by heroic efforts on the part of officials and staff. The power station at Fulham, London, suffered a direct hit on Sept. 9, 1940, and 190,000 kw. of plant was put out of action; yet in a few hours local services were in operation from the grid, substations and transformers having remained undamaged. During the battle of Britain, damage from bombs and from the trailing cables of escaped barrage balloons rose to a maximum.

The value of the grid was amply proved. Thanks to its existence, new factories in the safer areas could be erected in the knowledge that electrical power would be available.

The need for postwar planning caused a change in the attitude toward plant replacement. Normally the average life of generating machinery was taken as 20 years. By the winter of 1946-47, no less than 2,000,000 kw. of existing generating plant would have exceeded that term. The difficulty of replacing so large an amount, together with the construction of new plant to meet future expansion of demand, was obvious; the C.E.B. therefore assumed, in order to form a program, that an extension to 25 years would be reasonable and safe.

The question of nationalization, which became prominent during 1945 and 1946, had led to the tabling of a government bill at the beginning of 1947.

In the British commonwealth, the shortage of supplies caused by the war produced serious problems in other parts of the world. Overworked and undermaintained plant occasionally failed; machines ordered from Britain were not only delayed, but also sometimes lost at sea. Nor did difficulties cease with the end of hostilities.

All Australian undertakings experienced great difficulties in obtaining additional plant and material to meet the heavy demands of war, yet carried on with remarkable success. The State Electricity commission of Queensland, which had many of its smaller generating centres adversely affected, developed its sales from 148,000,000 units in 1937 to 269,000,000 units in 1942. Hydroelectric possibilities were being studied in north Queensland, the Land and Water Resources Development act of 1943 having con-



London repair squad working on a broken gas main beneath the pavement, after a bombing raid over the city during World War II

stituted a board of investigation for that purpose. Other acts were passed later providing for the reorganization of supply on the basis of regional development boards. At the end of 1946 there was, however, an urgent need for increased generating facilities.

The total connected load in relation to hydroelectric development in New Zealand increased from 2,152,201 kw. in 1940 to 2,814,103 kw. in 1943; the number of consumers from 426,354 to 460,771. In both islands the growth of secondary industries made necessary by the war was a factor in the increased demand. Of the total of 40 main stations, 32 were water-power, seven oil-engine driven, and one was a steam station.

In Tasmania, units generated in 1942 totalled 698,000,000, in 1944 738,000,000. Approximately 85% of the homes in Tasmania were supplied with electricity, and there was every reason to anticipate the establishment of new industries and the expansion of existing ones; but fluctuations in the available labour force proved a hindrance to the rapid progress of the program of constructive work.

The Electricity Supply commission of South Africa, established in 1923, moved in Aug. 1936 into its own building, Escom house, Johannesburg, which was officially opened in June 1937. Supply had begun in the previous year from the new Klip power station (the largest steam station in the southern hemisphere), and the great expansion of the gold mining industry at that time created a heavy demand. The loss of essential generating plant at sea hindered completion of extensions that had been begun in 1939, and the end of hostilities found power supply activities severely handicapped by shortage of generating capacity and distribution equipment. The commission in 1946 owned approximately 2,685 route mi. of transmission

678 lines and cables, and its licensed area of supply throughout the union covered about 34,369 sq.mi. A new record total of 4,861,000,000 units generated from the various power stations was established in 1945, exceeding by 7% the previous year's total. Bulk supplies for mining, etc., represented practically the whole output of the Klip and Vaal power stations and a large proportion of that of Witbank station. In 1946 an extension of railway electrification in the Capetown district was planned.

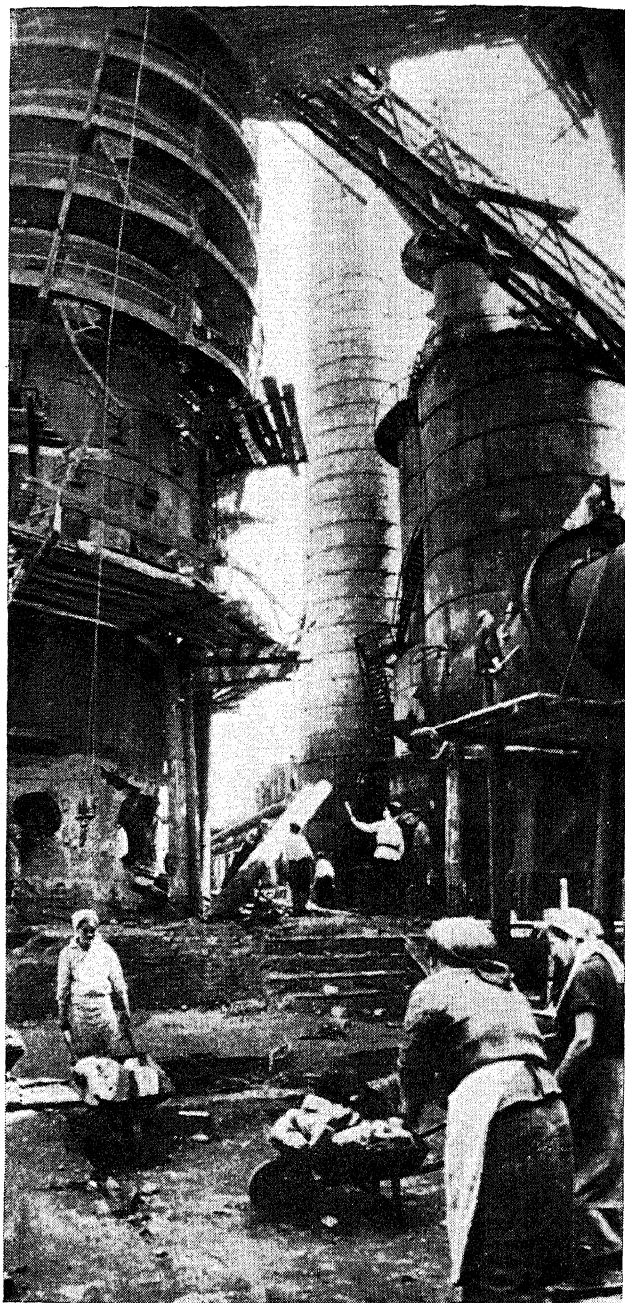
In Canada, taking a report of the Hydroelectric Power commission of Ontario alone, the total energy output handled by the commission in 1945 was 65% greater than in 1938, and the total energy production from all sources was nearly 12,500,000,000 kw.hr. In the years 1936-40 the commission actually constructed 9,373 mi. of rural primary line to serve a total of 55,000 consumers. This progress in rural electrification greatly benefited food production during the critical war period. Between 1941 and 1944 the restrictions on the use of materials stopped all further rural extensions, but in 1946 they had been actively resumed, and rates to rural consumers had been reduced. In 1944 a scheme of reducing the wholesale cost of supply to certain municipalities by means of a small levy per horsepower was successfully put into effect. An important development was the installation of 6 generating units with a total capacity of 360,000 h.p. on the Ottawa river, with the object of increasing the power resources of the southern Ontario system; for this project 235 mi. of transmission lines were required.

In India a Central Technical Power board had been established to initiate, co-ordinate and promote electrical power development throughout the country, in consultation with the provincial and states governments. It was also to organize research into electricity supply and carry out testing and standardization, encourage education and propaganda and in general promote the greater utilization of electricity.

(W. L. R.L.)

Gas.—In 1937 the gas industry in Great Britain and most European countries was largely composed of independently operated local units, each manufacturing and selling gas and its by-products in a single city, town or village. Local manufacture had been abandoned only where bulk supplies of gas were available at low cost as a by-product of coke ovens serving the steel industry (notably in Germany and Belgium) or from comparably large installations set up by the gas industry. Rising coal prices and wages, however, stimulated the use of mechanized plant in gasworks, which could most advantageously be employed at large works well situated for the receipt of coal and the dispatch of by-products. This encouraged the closing down of the smaller works and the laying of transmission mains to the districts previously supplied by them. Similar considerations prompted the further exploitation of surplus gas from the coke industry. These developments were for the most part sporadic, expansion outwards from the larger centres of production occurring piecemeal. They were practicable only where the demand in the adjacent areas and the relative cost of large-scale against local production justified transmission costs.

The decline of gas lighting was more than compensated for by developments in domestic cooking, water heating, refrigeration and space-heating loads. In the design of equipment, the trend was toward economy in consumption, improvement in appearance and, in the case of cookers, ease in cleaning. In the industrial field World War II provided added stimulus to the development of



Reconstruction work on the war damaged Leningrad gas works. Supply lines to industrial plants and apartment houses were established while work was still in progress

specialized appliances for process work; radiant heat, for example, was used for drying in line production. Gas was increasingly used in the preparation of foodstuffs, particularly in breadmaking, and for central heating in large buildings. In Britain, progress was made with the use of gas coke in domestic solid-fuel smokeless grates. The most significant development in the demand for by-products arose from the use of phenols and cresylic acid by the rapidly developing plastics industry.

The technical advances during 1937-46 resulted in a change in the political aspect of ownership. Where the advantages of centralized production could be realized, the purely local unit tended to be replaced by the large-scale undertaking formed by amalgamation under company or municipal aegis, while holding company groupings were an alternative to the same end. In postwar Europe, however, this trend gave rise to political proposals for na-

tionalization (hitherto adopted only in the U.S.S.R.) and in the case of France the state assumed control in 1946.

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(H. S. C. E.)

Water.—Before World War II, most water authorities in Great Britain were concerned with the need for extending and improving their works in view of the continuing increase in consumption, and many notable schemes were in course of construction. The Durham County Water board inaugurated the Burnhope reservoir; construction of the London Metropolitan Water board's three new reservoirs in the Thames valley and the Lee valley had started but was subsequently held up; Manchester corporation completed a masonry dam of novel design at Haweswater; and, among others, new reservoirs were being built at Ladybower and Fernworthy for the Derwent Valley Water board and Torquay corporation respectively. Several large schemes for supplying water to rural areas were also in hand.

With the outbreak of World War II, schemes on which building had not yet started were postponed; where it was necessary to meet additional wartime requirements, others were allowed to proceed, but progress was generally slow. In the so-called "safe areas," numerous authorities which had hitherto found themselves adequately supplied, were suddenly confronted with considerably increased calls on their resources, for reasons connected with war production and the requirements of a temporarily increased population. Supplies had to be restricted or temporary schemes put into operation. In vulnerable areas, special attention was directed to the protection of plant and buildings; improvements were carried out to distribution systems and the location of valves and hydrants; static water tanks for fire-fighting purposes were provided in thousands to augment the supply from mains, and alternative sources of supply were prepared. Adequate and reliable sterilization equipment was kept ready for use whenever the supply of water through repaired mains was resumed after aerial attack. Thanks to these precautions no serious epidemic attributable to the pollution of water occurred throughout the war. To meet the needs of the fighting forces in the field the provision of a safe supply of water, at short notice, was of paramount importance, and most efficient portable distilling and filtering plants were manufactured in large quantities. A noteworthy achievement was the successful development of a simple chemical process and small apparatus for producing drinking water from sea water. It saved the lives of countless airmen and shipwrecked sailors.

In 1944 parliament passed the Rural Water Supplies and Sewerage act, whereby water contractors and county councils were to take steps to provide piped supplies, if reasonably practicable, to all houses and schools in rural

areas. Toward the cost of construction the minister of health was empowered to make grants—conditional upon similar grants by the county councils—up to a total sum of £100,000,000. In 1945–46, numerous rural supply schemes were prepared but very little construction was begun. The Water act, 1945, laid down the procedure under which the minister of health assumed the responsibility for the conservation and proper use of the country's water resources and supplies. The government policy was to eliminate small water supplies and works, and where advisable, to set up water boards and to effect amalgamations. Many such proposals were under consideration.

In Europe World War II brought havoc to many waterworks. The Moehne and Eder dams in Germany and the Tirso dam in Sardinia, among others, were partially destroyed by bombing. The last mentioned was the highest multiple arch dam in Europe. Soviet Russia suffered severely, particularly during the German retreat, and many splendid waterworks, among them the Dnieprostroi, were wrecked. The preparation of new schemes began in 1944.

In India considerable attention was directed to the improvement of water supplies and modern schemes were in course of development for all places with a population of 10,000 persons and over. The supply for Calcutta was to be increased to 300,000,000 gal. per day. A scheme for conveying more than 3,000,000 gal. per day from the Murray river, Australia, through 223 mi. of concrete-lined steel pipes to Whyalla was completed in 1944. Further works were also being planned for augmenting the supply to Durban (S. Africa), involving the construction of a large concrete dam, and two schemes were envisaged at Table mountain to yield a supply of 55,000,000 gal. per day. (See also DAMS; ELECTRICAL INDUSTRIES; FEDERAL COMMUNICATIONS COMMISSION; FEDERAL POWER COMMISSION; RURAL ELECTRIFICATION; TENNESSEE VALLEY AUTHORITY; WAR AND DEFENSE AGENCIES; WAR PRODUCTION; WATER POWER.)

(J. Kd.)

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Public Works Administration

See FEDERAL WORKS AGENCY.

Publishers' Prizes

See LITERARY PRIZES.

Publishing (Book)

See BOOK PUBLISHING.

Puerto Rico

An unincorporated territory of the United States directly under control of congress, Puerto Rico is approximately 1,600 mi. south by east of New York city, 1,000 mi. east by south of Florida and 500 mi. north of Venezuela. The pop. by 1940 census was 1,869,225 (whites, 76.2%;

Negroes, 23.8%) and was est. at 2,101,698 in 1946. The executive head or governor is appointed by the president of the United States. Heads of the insular government's seven departments (education, justice, health, interior, treasury, agriculture and commerce, and labour) act as a cabinet, appointed by the governor except for the first two, who are appointed by the U.S. president. The insular legislature consists of 19 senators and 39 representatives elected by Puerto Ricans every four years.

In the last year of the decade 1937-46 two events of major importance to the island's drive toward eventual self-government, promised to aid in the solution of the vital question of Puerto Rico's ultimate political status. The governor, Jesus T. Pinero, who was inaugurated on Sept. 3, 1946, was the first native-born Puerto Rican to hold this post in the entire history of the island, under either Spanish or U.S. control. His appointment by Pres. Truman was considered an important step toward greater Puerto Rican autonomy. Previously, in Oct. 1945 Pres. Truman had recommended to congress that it enact legislation to submit various alternatives of ultimate political status to the people of Puerto Rico in order to ascertain what the people themselves desired most for their political future.

Economic and Industrial Progress.—One of the most densely populated areas in the world, with more than 600 persons per sq.mi., Puerto Rico continued to suffer from chronic unemployment. With an agrarian economy, plus the fact that almost one-half of the island is mountainous, about two-thirds of the island's population had, by U.S. standards, a low level of living. To counteract this economic unbalance, constantly increasing federal government assistance was essential, particularly in the decade 1937-46.

Puerto Rico received the full impact of the world-wide depression of the 1930s, and to aggravate the island's plight, it had been devastated by two hurricanes (in 1928 and 1932), striking within four years of each other. In 1935, on Pres. Roosevelt's recommendation, the congress appropriated \$24,000,000 to set up the Puerto Rican Reconstruction administration. Later appropriations brought the total to about \$76,000,000.

This agency aimed primarily to improve the condition of rural workers and small farmers in the sugar industry and to effect economic renovation of coffee and tobacco areas. No added funds were appropriated for P.R.R.A. after 1940, but P.R.R.A. had assisted the island through a very difficult period of economic stress, and many basic improvements to the economy of the island were effected.

In 1939 the Works Progress administration was extended to Puerto Rico and operated from Sept. 1939 until Dec. 1943, six months after it had been discontinued in the United States. Although it lacked an over-all reconstruction program, WPA had a case load of 40,000 Puerto Ricans on its pay roll, using their services for useful projects. One of its most important contributions was the institution of the school lunch in Puerto Rico. Operating in conjunction with the food distribution administration and the department of education, WPA by 1943 was serving lunch five days a week to almost 200,000 children, many of whom would have been badly undernourished without it.

World War II immediately affected Puerto Rico's food supply and employment problems adversely. The German submarine campaign in the South Atlantic began a month after Pearl Harbor and established a stringent import and export blockade. Since the island imports its staple items of

diet—rice, beans, meat, potatoes, codfish, flour, butter and lard,—an acute food shortage and even starvation for thousands were threatened. Co-ordinated action by the U.S. departments of the interior and agriculture and insular government averted severe suffering for the people.

The blockade augmented unemployment by withholding from insular industries mechanical equipment and raw material, the greater part of which came from the United States. The needlework industry was at a low point during the greater part of the war.

When the emergency need for industrial alcohol compelled suspension of liquor manufacture in the United States, however, Puerto Rican rum found an enormously expanded market, profitable not only to the local distillers but also to the insular government, since the Organic act provided that federal revenue taxes collected on island products be returned to the Puerto Rican government.

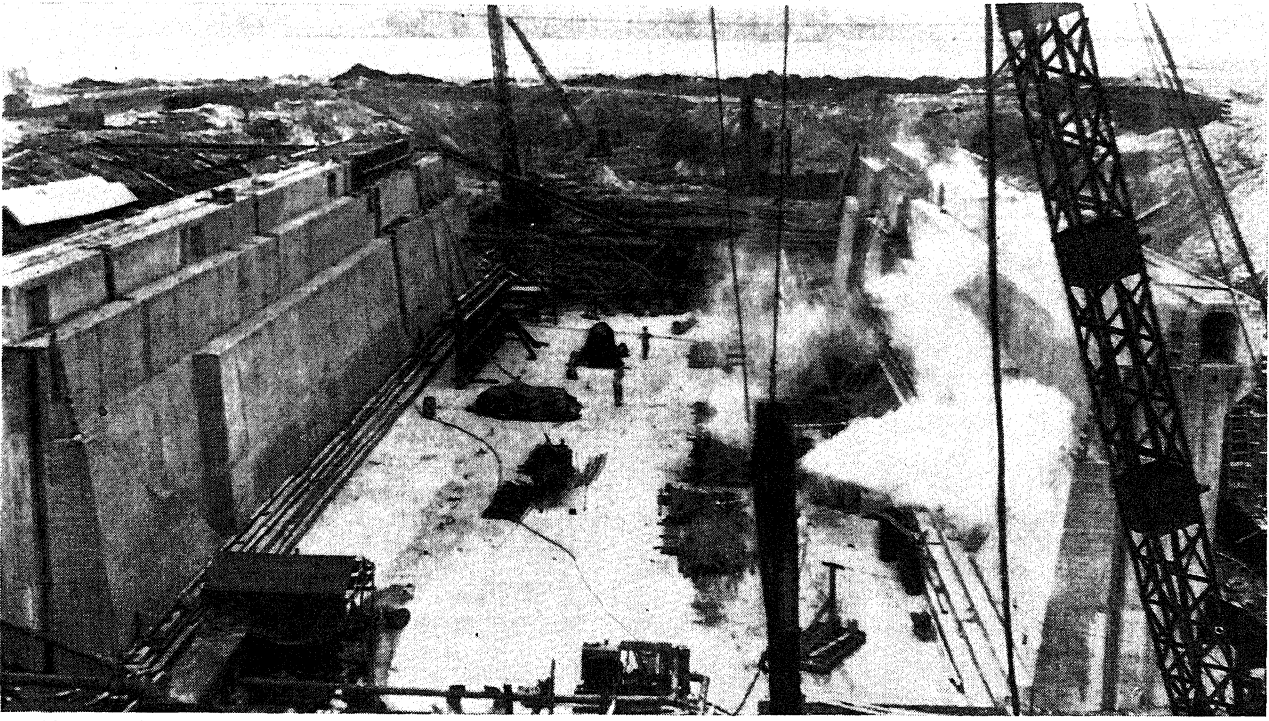
Significant social and economic reforms and improvements were put into effect in the decade. The Puerto Rican legislative sessions of 1941 and 1942 together set up the planning board, the land authority, the Puerto Rico Industrial Development company, the Puerto Rico Development bank and various other reform agencies.

Social and Cultural Progress.—Puerto Rico had become outstanding, among areas comparable in size and resources, in the type of laws enacted by its legislature, especially those put into effect within the ten years 1937-46. The legislation indicated a desire for comprehensive local improvement and stressed social advancement. In 1936 alone, acts approved had included: provision of hospital aid to war veterans, share croppers law, law to protect new industries, weights and measures standard law, fishing industry law, income tax law, public works law, law on prohibition of child labour and the staple food price-control law. This type of legislation, together with foresightedness of political leaders, was credited for the constantly elevating commercial, educational and social relations with the mainland. When Puerto Rico came under the jurisdiction of the United States, 77.3% of the people were illiterate. There were very few schools or educational institutions of any kind. Rapid advances in the public school system, educational methods and techniques lowered the rate of illiteracy to somewhat less than 31.5% by 1940.

Puerto Rico had developed an elementary vocational rural school, known as the second-unit school, that was being adopted in Latin American countries having similar educational problems. It provided a combination of academic and vocational training for rural children through the sixth grade, and also served as an education and cultural centre for both parents and children. The schools directed their programs chiefly toward the community, its problems, activities and resources. Training in agriculture, carpentry, repair work, cooking, care of children and health education were stressed. A social worker, attached to each school, worked with the families of the community.

The University of Puerto Rico, modelled along universities in the United States, was adapted to the particular needs of the island. With Puerto Ricans keenly aware of the advantages of higher education, the university's enrolment steadily grew to more than 4,000 full-time students in 1946.

The university was engaged in research work aimed at the solution of problems directly affecting the island. It carried on extended social research to discover how best to improve economic and social conditions in Puerto Rico. During the decade, the institution became more and more a central meeting place for exchange of ideas on continental and Latin-American cultures. Annually, lecturers, pro-



Caribbean drydock for the U.S. navy near San Juan, Puerto Rico, as it appeared under construction in 1940. The \$3,000,000 dock was designed to receive ships drawing up to 29 ft. of water

fessors and students from various countries in North, South and Central America, visited the university, and in turn, representatives of the university regularly went abroad to study and teach.

Wartime and Postwar Progress.—The military fortification of Puerto Rico began in 1939 with the growing threat to world peace. Airfields were constructed in various parts of the island, roads were built, and San Juan was armed

against attack. With U.S. entrance into World War II, the tenth naval district, with headquarters in San Juan, was declared a front line, combat area. Throughout the war, large numbers of continental and Puerto Rican troops were stationed in the island.

Puerto Ricans entered every branch of the service. While some Puerto Rican troops went to the Pacific and to the European theater of operations, others guarded the Canal Zone and the general Caribbean area.

Many of the 60,000 young Puerto Ricans who saw action never had seen life beyond the shores of the island.

They returned with a knowledge and appreciation of life in the United States, in Italy, France, Germany, China, Japan and India. They brought back to their island ambitions and ideas for its improvement, engendered and fostered by their travels.

The decade, finally, saw tremendous expansion of air transportation facilities in Puerto Rico. In 1945 the civil aeronautics board approved applications for routes to Puerto Rico by four major airlines, and several lines began to operate. Puerto Rico's capital, San Juan, became one of the nation's important airports.

(E. G. A.)

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Puerto Rico: Statistical Data

Item	1938		1940		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Finance						
Government revenues	\$43,900		\$16,867		\$156,965	
Government expenditures	\$44,255		\$14,932		\$97,289	
National debt	\$43,306		...		\$29,284	
Transportation						
Railroads		384 mi.		387 mi.		384 mi.
Highways		1,373 mi.		1,460 mi.		1,855 mi.
Communication						
Telephones		14,901		17,417		22,708
Telegraph lines						1,142 mi.
Radio sets		25,000		47,790		...
Minerals						
Manganese ore		1,145 tons				
Crops						
Sugar cane (Sugar content)		1,077,149 tons		1,018,803 tons		1,039,239 tons*
Tobacco		22,035 "		9,943 "		4,211 "
Citrus fruits		18,519 "		...		...
Coffee		8,320 "		16,326 tons		...
Manufactures						
Total	\$111,500†	...				
Food	\$71,874†	...				
Needlework	\$20,778†	...				
Beverage	\$4,941†	...				
Chemical	\$4,044†	...				
Exports—Total	\$82,077	...	\$92,347	...	\$92,196*	...
Sugar (refined)	\$44,447	629,595 tons	\$41,457	689,566 tons	\$50,501*†	690,201 tons*†
Cotton manufactures	\$9,723	...	\$7,871	...	\$4,115*†	...
Sugar (refined)	\$9,698	105,946 tons	\$15,872	179,002 tons	\$6,168*†	56,886 tons*†
Tobacco (unmanufactured)	\$8,239	10,349 "	\$6,029	8,544 "	\$9,546*	8,992 "
Rum	\$3,101	694,343 "	\$5,568	1,137,951 gal.	\$9,578*†	2,237,087 gal.*†
Imports—Total	\$93,315§	...	\$107,030§	...	\$83,792§	...
Cotton manufactures	\$8,159§	...	\$8,635§	...	\$10,522§	...
Grains and preparations	\$7,847§	...	\$10,577§	...	\$4,511§	...
Machinery and vehicles	\$7,673§	...	\$12,679§	...	\$3,535§	...
Education						
Public day school students		262,260		281,157		302,806*
Private accredited school students		...		12,374		11,718

*1943.

†1939.

‡To U.S. only.

§From U.S. only.

P. R., *The Story of a Warbase* (San Juan, 1943); T. Roosevelt, *Colonial Policies of the U.S.* (1938); J. W. Thompson, *Puerto Rico* (1940); R. G. Tugwell, *Puerto Rican Public Papers* (San Juan, 1945); *Ann. Rept. of the Gov.*; Periodicals: *Economic Review*, *P.R. Journal of Public Health and Tropical Medicine*, (San Juan).

Pugilism

See BOXING.

Pulitzer Prizes

Pulitzer prizes "for exceptional achievement in journalism and letters," to be awarded annually, were set up by the will of Joseph Pulitzer, publisher of the *St. Louis Post-Dispatch* and the *New York World* and founder of the Columbia university school of journalism. Awards were to be made by the trustees of Columbia university on the recommendation of the Advisory board of the graduate school of journalism.

At the end of the decade, all awards were valued at \$500. Prior to 1942, prizes in the letters division and in the local reporting category of the journalism division were \$1,000. Between 1937 and 1946 four new award categories were set up. In three of these—news photography, national telegraph reporting and international telegraph reporting—awards were made for the first time in 1942. The fourth, in the field of musical composition, was first announced in 1943.

Awards for distinguished examples of newspaper cartoonists' work were made to the following artists: 1937, Clarence Daniel Batchelor; 1938, Vaughn Shoemaker; 1939, Charles G. Werner; 1940, Edmund Duffy; 1941, Jacob Burck; 1942, Herbert Lawrence Block; 1943, Jay Norwood Darling; 1944, Clifford K. Berryman; 1945, Bill Mauldin; 1946, Bruce Alexander Russell.

Pulitzer prizes in letters were awarded in five classifications: the novel, the drama, history, biography and poetry.

For distinguished novels, prizes went to the following works and their authors: 1937, *Gone with the Wind*, by Margaret Mitchell; 1938, *The Late George Apley*, by John Phillips Marquand; 1939, *The Yearling*, by Marjorie Kinan Rawlings; 1940, *The Grapes of Wrath*, by John Steinbeck; 1941, no award; 1942, *In This Our Life*, by Ellen Glasgow; 1943, *Dragon's Teeth*, by Upton Sinclair; 1944, *Journey in the Dark*, by Martin Flavin; 1945, *A Bell for Adano*, by John Hersey; there was no award in the novel category in 1946.

For original American plays considered to represent the educational value and power of the stage, prizes were awarded to eight dramatic productions and their authors: 1937, *You Can't Take It with You*, by Moss Hart and George S. Kaufman; 1938, *Our Town*, by Thornton Wilder; 1939, *Abe Lincoln in Illinois*, by Robert E. Sherwood; 1940, *The Time of Your Life*, by William Saroyan; 1941, *There Shall Be No Night*, by Robert E. Sherwood; 1942, no award; 1943, *The Skin of Our Teeth*, by Thornton Wilder; 1944, no award; 1945, *Harvey*, by Mary Chase; 1946, *State of the Union*, by Howard Lindsay and Russell Crouse.

Ten historians received prizes for distinguished books on U.S. history: 1937, *The Flowering of New England*, by Van Wyck Brooks; 1938, *The Road to Reunion—1865–1900*, by Paul Herman Buck; 1939, *A History of American Magazines*, by Frank Luther Mott; 1940, *Abraham Lincoln, The War Years*, by Carl Sandburg; 1941, *The Atlantic Migration, 1607–1860*, by Marcus Lee Hansen; 1942, *Reveille in Washington*, by Margaret Leech; 1943, *Paul*

Revere and the World He Lived In, by Esther Forbes; 1944, *The Growth of American Thought*, by Merle Curti; 1945, *Unfinished Business*, by Stephen Bonsal; 1946, *The Age of Jackson*, by Arthur Meier Schlesinger, Jr.

For distinguished U.S. biographies, prizes were awarded to 11 writers: 1937, *Hamilton Fish*, by Allan Nevins; 1938, *Pedlar's Progress*, by Odell Shepard, and *Andrew Jackson*, by Marquis James; 1939, *Benjamin Franklin*, by Carl Van Doren; 1940, *Woodrow Wilson, Life and Letters*, vols. vii and viii, by Ray Stannard Baker; 1941, *Jonathan Edwards*, by Ola Elizabeth Winslow; 1943, *Admiral of the Ocean Sea*, by Samuel Eliot Morison; 1944, *The American Leonardo, the Life of Samuel F. B. Morse*, by Carleton Mabee; 1945, *George Bancroft: Brahmin Rebel*, by Russel Blaine Nye; 1946, *Son of the Wilderness*, by Linnie Marsh Wolfe.

In the field of poetry, nine writers were awarded prizes: 1937, *A Further Range*, by Robert Frost; 1938, *Cold Morning Star*, by Marya Zaturenska; 1939, *Selected Poems*, by John Gould Fletcher; 1940, *Collected Poems*, by Mark Van Doren; 1941, *Sunderland Capture*, by Leonard Bacon; 1942, *The Dust Which Is God*, by William Rose Benét; 1943, *A Witness Tree*, by Robert Frost; 1944, *Western Star*, by Stephen Vincent Benét; 1945, *V-Letter and Other Poems*, by Karl Shapiro; 1946, no award.

Pulitzer Prizes for distinguished musical composition by Americans were given to four composers: 1943, William Schuman; 1944, Howard Hanson; 1945, Aaron Copland; 1946, Leo Sowerby. In 1944, a special award was made to the musical play, *Oklahoma!*, by Richard Rodgers and Oscar Hammerstein, 2nd. (See also LITERARY PRIZES; NOBEL PRIZES.)

Pulp Industry

See PAPER AND PULP INDUSTRY.

Pulpstones

See ABRASIVES.

Pumice

See ABRASIVES.

"Purge," New Deal

See DEMOCRATIC PARTY; ELECTIONS.

PWA (Public Works Administration)

See FEDERAL WORKS AGENCY.

Pyle, Ernest Taylor

Pyle (1900–1945), U.S. newspaperman, was born Aug. 3, 1900, on a farm near Dana, Ind. He studied at Indiana university but left a few months before graduation to become a reporter for a small town newspaper. He was copy editor for the *Washington Daily News*, 1923–26, and aviation editor for the Scripps-Howard papers from 1928 to 1932. Wearying of editing, he acquired a roving assignment and his daily experiences supplied material for a column which appeared in 200 newspapers. His simple human touch won a wide following, and thousands of readers shared in the restless wanderlust of the writer. When World War II started, he went to England; his vivid eyewitness descriptions of how Londoners were enduring the German air blitz established his reputation as one of the foremost U.S. war correspondents. From England he went to North Africa, where he lived in foxholes with the ordinary U.S. soldier. His columns, interpreting in simple language the fears, hurts and loneliness of the soldiers, established a link between the G. I. and his family back home. His coverage of the campaigns in North Africa,

Sicily, Italy and France brought him the Pulitzer prize in 1944 and several other newspaper awards. Fighting men looked upon him as their friend, and officers regarded him as a great morale-booster. In the fall of 1944, he apologetically withdrew from the war front to return home for a rest. Compilations of his columns appeared in book form: the first, *Ernie Pyle in England* (1941), was followed by two best sellers, *Here Is Your War* (1943) and *Brave Men* (1944). After a brief stay in the United States, Pyle was compelled by a sense of duty to return to the war—this time in the Pacific. He covered the Iwo Jima campaign, moved on to Okinawa with the marines and then to nearby Ie Island. There, at a point where all Japanese opposition seemingly had been overcome, he was killed by machine-gun fire, April 18, 1945.

Pyrite

The peak of pyrite output during World War II was 9,900,000 short tons in 1942 and 1943, as compared with 11,000,000 in 1937 and 1938; after 1943, output declined sharply.

In the United States, an increase of 40% in pyrite production between 1937 and 1943 failed to offset declines in imports, leaving a 5% decrease in the available supply. Transportation difficulties gradually cut imports from Spain almost to nothing, and the increasing supplies from Canada failed to meet the deficit in the Spanish shipments. In 1937 the available supply included 53% of domestic origin, 43% from Spain and 2% from Canada; in 1942 the corresponding figs. were 71%, 2%, and 28%. Between 1943 and 1945, the United States output declined 10%, and imports dropped 27%, a decrease in available supply of 14% as compared with 1943, and of 18% as compared with 1937. Since about three-quarters of the total sulphur from all sources continued to be used in the production of sulphuric acid, it was pertinent to note the increasing amount of acid produced from roaster gases at copper and zinc plants treating sulphide ores. This source of sulphur was almost as large as the pyrite output itself.

The Canadian output increased more than three-fold, the greater part of which was exported to the United States, largely but not entirely replacing the imports no longer accessible from Spain. (See also SULPHUR.)

(G. A. Ro.)

Qavam-es-Salteneh, Ahmad

See GHAVAM-ES-SALTENEH, AHMAD.

Table I.—World Production of Pyrite
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Canada . . .	119,457	44,604	227,635	127,765	303,360	379,493	284,576	250,069	227,732
Cyprus . . .	435,497	577,141	445,262	126,579	6,817	5,568	14,548	?	?
Finland . . .	100,653	113,515	128,972	108,422	155,138	138,373	121,794	?	?
France . . .	160,739	162,269	198,725	221,168	227,815	240,767	239,146	189,437	161,625
Germany . . .	493,113	512,840	552,664	1,000,991	1,318,861	1,340,385	1,540,000	?	?
Greece . . .	227,793	269,000	239,422	?	?	?	?	?	?
Italy . . .	1,008,090	1,025,493	1,077,695	1,169,076	1,127,739	1,069,930	?	?	112,996
Norway . . .	1,155,553	1,132,929	1,129,817	840,305	1,028,391	906,328	891,526	827,180	?
Portugal . . .	665,941	615,450	549,525	438,796	190,434	141,404	121,248	145,384	188,459
Spain . . .	2,509,966	3,004,006	2,860,000	1,055,701	633,312	691,155	971,301	564,658	?
Sweden . . .	190,665	205,460	211,354	214,085	250,049	?	?	?	?
United States . . .	654,256	622,304	581,837	701,837	722,688	806,807	898,670	883,154	809,308
Yugoslavia . . .	147,693	165,790	141,086	161,400	?	?	?	?	?
Total (est.) . .	11,000,000	11,000,000	10,700,000	9,500,000	9,400,000	9,900,000	9,900,000	7,700,000	6,600,000

Table II.—Data of the Pyrite Industry in the United States
(Short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Production	654,256	622,304	581,837	701,837	722,688	806,807	898,670	883,154	809,308
Sulphur content	259,700	245,200	246,100	293,400	302,800	343,700	377,400	372,700	331,800
Imports, total	587,362	374,342	540,216	455,844	413,099	336,157	287,065	202,544	208,888
Canada	23,025	33,672	198,020	90,896	273,601	316,845	221,480	186,654	153,707
Spain	539,390	340,044	316,660	364,721	139,139	18,548	65,279	15,891	53,829
Available supply	1,241,618	996,646	1,122,053	1,157,701	1,135,787	1,142,964	1,185,735	1,085,698	1,018,196
Byproduct equivalent* .	542,000	447,000	506,000	547,000	595,000	624,000	798,000	754,000	705,000

*Approximate pyrite equivalent of the sulphur made into sulphuric acid in the roasting of copper and zinc ores.

"Quadrant" Conference (Quebec, 1943)

See INTERNATIONAL CONFERENCES, ALLIED (WORLD WAR II).

Quakers

See FRIENDS, RELIGIOUS SOCIETY OF.

Quartz

See MINERALOGY; STANDARDS, NATIONAL BUREAU OF.

Quartz Crystals (Radio)

The enormous increase in demand for radio-grade quartz crystals which resulted from World War II found the United States unable to produce more than insignificant amounts—5,800 lb. in 1943 and 3,934 lb. in 1944. Although small amounts were imported from other sources, Brazil was almost the sole source of supply. The effect of war demand may be traced in the following data:

	Imports,* lb.	Consumption, † lb.	Finished crystals produced, lb.
1937	32,821	?	?
1938	56,171	?	?
1939	67,052	?	?
1940	126,521	31,000	?
1941	2,237,608	59,000	?
1942	2,612,106	682,000	6,888,000
1943	3,356,000	1,588,000	22,575,000
1944	2,300,506	1,858,000	29,939,000
1945	1,329,798	1,040,000	18,918,000

* Includes optical grades.

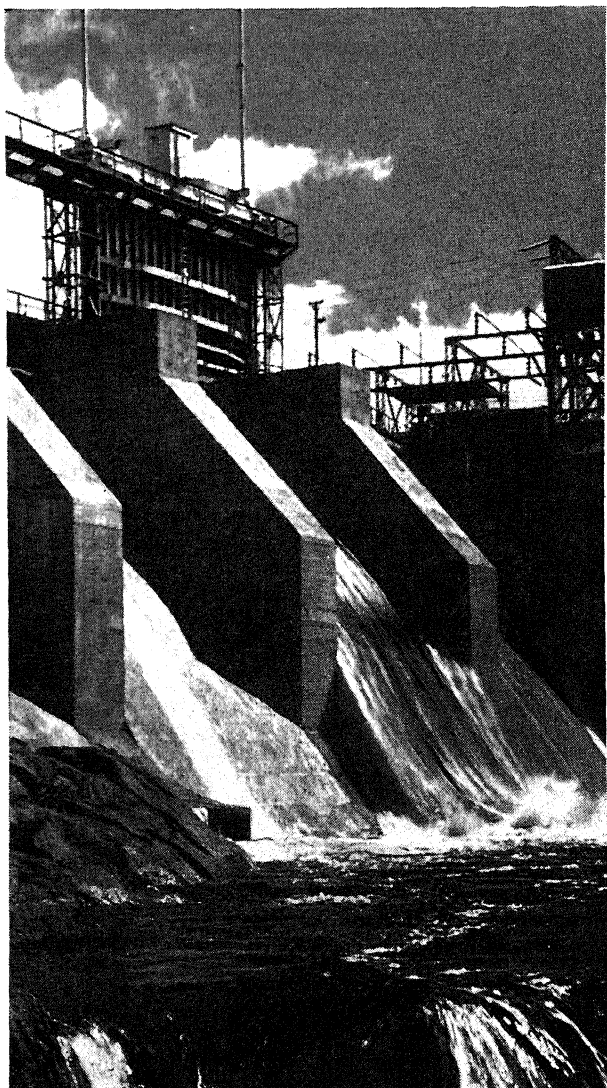
† Radio grades only.

The demand for radio quartz was so great that during the height of German submarine activities, the crude crystals were flown from Brazil to the United States in planes. With improved cutting efficiency, the use of smaller sizes, and the development of methods for rehabilitating imperfect plates, the number of plates cut from a lb. of crystal increased from 9.5 in 1942 to 18 in 1945. The transportation load was reduced by more careful inspection and rejection of unsuitable crystals before shipping from Brazil.

In 1944 there were 113 companies cutting quartz crystals in the United States, of which possibly not more than 20 were required for postwar needs. (G. A. Ro.)

Quebec

The Canadian province of Quebec occupies most of the lower basin of the St. Lawrence river, but its northern wilderness of Ungava extends to 60° 40' latitude. Its southern boundary is mainly based on the 45th parallel, bordering New York, Vermont and New Hampshire; while to the southeast and east it adjoins New Brunswick, and to the west Ontario as far as 79° 33' longitude. Its land area is 523,860 sq. mi., of which only the southern one-third is populated. The capital is the city of Quebec (pop. 1941-150,757); other cities are Montreal (903,007, greater Montreal 1,139,921), the largest city in Canada; Trois Rivières (42,007); Sherbrooke (35,



Spillway supplying 540,000 h.p. to an aluminum plant near Arvida, Quebec, where increased wartime demands for aluminum speeded completion of hydroelectric power developments on the Saguenay river

956); and Hull (32,947). Both the French and English languages are legal, but the French language is used by the greatly predominant population of French origin. The provincial government is affiliated with the Roman Catholic Church, and 86.9% of the people are Catholics; but all religions are tolerated, and other percentages are Anglicans 4.9, United Church 3.0, Hebrews 2.0 and Presbyterians 1.7. The 1941 Dominion census gave the population of the province as 3,331,882, of which the French race had 2,695,000, the British races 452,887, the Hebrew race 66,277 and the Italian race 28,051. The French race in Canada as a whole totalled 3,483,038, or 30.27% of the population of Canada, and outside of Quebec is situated largely in adjoining New Brunswick and Ontario. On account of its high natality the population of Quebec showed a decennial increase of 15.90% in 1941 as compared with 10.89% for Canada as a whole, and its cities also increased more rapidly than those of other provinces.

National Union Government—First Phase.—The Liberal party controlled the provincial government of Quebec for 39 years up to 1936; and its leaders, especially the last premier, Alexandre Taschereau, were not adverse to industrial development by English-speaking Canadian and U.S. large business interests. A dissident group known as Na-

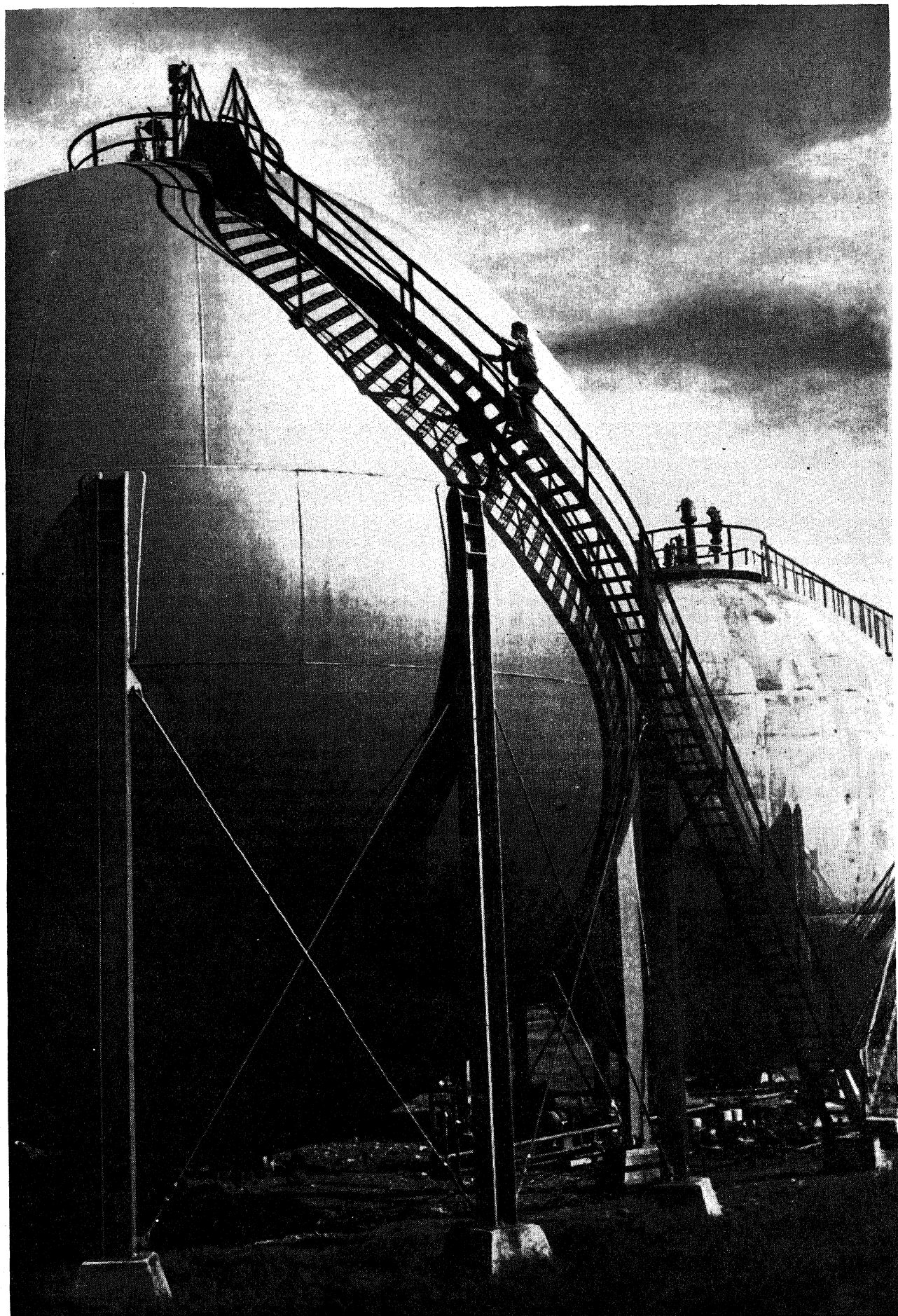
tional Action Liberals challenged this co-operation in the name of French-Canadian nationalism. During the depression the Conservative dominion government had asserted centralized authority by a series of "New Deal" directed economy laws trenching upon the provincial rights set forth in the British North America act of 1867, to which the people of Quebec were attached because of the special status in the dominion which it gave them. When the new Liberal government at Ottawa in 1936 showed a tendency to continue the centralizing policy at the expense of the authority of the provinces, the opposition party in Quebec, theoretically Conservative and led by the able Maurice Duplessis, had a popular issue against the Liberals in Quebec. In alliance with certain National Action leaders it formed the National Union, and aided by hard times it pressed charges of corruption, non-nationalism (French-Canadian) and abandonment of provincial privileges. Forcing an election in Aug. 1936, Duplessis overthrew the Taschereau administration, taking 76 of the 85 seats in the Quebec parliament.

Premier Duplessis' supporters at this stage included many advocates of the complete separation of Quebec from the Dominion, with the establishment of a French-Canadian republic, "Laurentia." He sanctioned a law making the French language predominant in the interpretation of provincial statutes. When Prime Minister King at Ottawa appointed the Rowell commission to study a revision of the British North America act toward centralization, Duplessis announced that the Quebec government would not recognize the commission and that any attempts at centralization would meet fierce resistance. Another group of his supporters had strongly fascist aims, including the "nationalization" by the province of large industrial enterprises, the formation of labour and other guilds, and the institution of a corporative government; so that his regime gained the reputation of being National Socialist or semi-totalitarian.

At this time C.I.O. organizers, mainly from the United States, were conducting a campaign to unionize labour in Quebec and elsewhere along communistic lines, and in repressing them Duplessis was able to gratify his authoritarian followers to some extent. In March 1937 his parliament passed a so-called "Padlock Law" permitting provincial officers to close any premises used for socially subversive gatherings or propaganda; and throughout the year it was used with Draconian severity. When the success of certain C.I.O. strikes showed that labour was in reality restive, Duplessis passed a Workmen's Wages act, providing for the establishment of standard labour conditions by direct agreements which the government would enforce and generalize. Again late in the year, when stern measures against agitators seemed likely to raise antagonism, the Fair Wages board which Duplessis had created in the summer handed down awards of wage increases on a large scale for all workers. The firm policy toward radicalism pleased the Catholic Church, the official religion of the province, which was promoting unions under its own auspices. It also pleased the big industrialists, and Duplessis' relations with them became better than his ultranationalist adherents could brook; so that when he declined to press for the socialization of utility enterprises he was deserted by several prominent political leaders.

The second congress of French language groups in North

→
Hortonshperes at the Shell oil plant in Montreal, East Quebec, used in making 100-octane aviation gasoline during World War II. The spherical tanks guaranteed continued pressure on gas to prevent loss by evaporation



America was held at Quebec in 1937, with the presence of Gov. Leche of Louisiana as well as Louis Bertrand of the Académie Française. Another development was the founding of a formal Fascist party of Quebec by M. Adrien Arcand, regarded as an associate of Duplessis. It advocated the usual fascist doctrines, and opposed Semitism, Masonry and democracy. For a time its existence caused Duplessis himself to be regarded as semi-fascist, but in 1938 it suffered scissions, joined with similar parties in the prairie provinces and gradually disintegrated. It had some support among the clergy; but in general there was more clerical interest in French-Canadian nationalism, involving the expulsion of Anglo-American interests from businesses utilizing the natural resources of the province. Abbé Lionel Groulx, of the University of Montreal, a gifted intellectual, was conspicuous in this movement in 1938, but the clergy did not advocate the withdrawal of the province from the dominion or empire.

A curious alliance grew up in 1938 between Duplessis and the independent-Liberal Premier Hepburn of Ontario. Both premiers were opposed to constitutional reforms which might sap provincial authority, since their provinces were wealthier than the other seven provinces and would furnish the largest share of the tax funds from which national social experimentation would be financed. They also objected to the St. Lawrence waterway project, which might weaken Montreal as a port and take hydro-electric power from Ontario; and they favoured high tariffs because of their manufactures. They wished to be permitted to export electric power to the United States, which Ottawa felt would cause international complications.

Evidence of racial particularism appeared in 1938 in the wide celebration in Quebec of the centenary of the Papi-neau rebellion of 1837-38, regarded as the origin of self-government for the Canadian provinces. Evidence that Duplessis was able to co-operate with big business was afforded by the inauguration of the Baie Comeau paper mills created by the Ontario Pulp and Paper company in conjunction with the McCormick interests of Chicago.

Liberal Victory.—When World War II broke out in the summer of 1939, there was question as to how French-Canadian sentiment would react, not only because of the Anglo-Saxon issue but because of the emergency powers which the Dominion assumed to meet the crisis. Duplessis confidently called new provincial elections on an anti-war platform in the early autumn. The result showed that he had overestimated the influence of the fascist and nationalist orators and writers; the Liberals won 68 of the 85 seats. The people felt an attachment to the British monarchs, who had visited the province in the spring; and they had been reassured in advance by Prime Minister King and his minister of justice, Ernest Lapointe, that they would have full voice in any war decisions made by the Dominion. The new Quebec government, headed by Adélard Godbout as Liberal premier, at once manifested a spirit of co-operation with the dominion Liberal government. A Canadian supreme court decision in Jan. 1940, negating the right of England to dominate Canada, was also gratifying to Quebec opinion.

At the time of the dominion national elections of March 1940 French Canada was again promised by King and Lapointe that there would be no conscription for overseas service; and it felt that a Liberal government, without a union cabinet including Conservative anti-Quebec members, could prosecute the war with the least danger to Quebec's special preoccupations. Accordingly, 64 of the 65

Quebec members of the dominion parliament were elected by the Liberals. When the Rowell commission made its report favouring an increase in national as compared with provincial powers, King suspended consideration of it indefinitely. He accepted the Quebec idea that so long as no constraint was applied the French Canadians would furnish numerous volunteers for the armed forces, and in this policy he was strongly aided by the highly-respected Cardinal Villeneuve. The German capture of France shocked French Canada. King had no difficulty in enacting a national mobilization law, or in interning Mayor Camillien Houde of Montreal when the latter preached resistance to registration. Arcand and his acolytes had already been interned.

During 1940, the new Quebec legislature voted a number of important new laws, granting female suffrage in April, creating a ministry of social welfare in October and arranging the abolition of the archaic seigneurial land rents in November. In 1941 it took over for the province the large Beauharnois electric company, a step toward socialization which Duplessis' Union Nationale had not ventured.

Quebec and the War Effort.—Throughout 1941, the entente with the King government was maintained. Voluntary recruiting was as fruitful as in several of the English-speaking provinces, and Godbout announced that French Canada was thoroughly anti-totalitarian. A noteworthy physical disaster was the forest fire near Lake St. John which lasted a week and ravaged 2,000 sq.mi. of timber. A more significant misfortune was perhaps the death at the end of the year of minister of justice Lapointe at Ottawa, the greatest leader of the French Canadians since Laurier and a main bulwark of Premier King's policies. He was replaced by a distinguished Quebec jurist, Louis St. Laurent; and early in 1942 Quebec joined with the other provinces in ceding war income tax rights to the Dominion on a compensation basis. Many war industries were created in Quebec by the national government, with resultant full employment and prosperity.

By April 1942 Prime Minister King was forced by the military situation to hold a national plebiscite to secure release from his pledges against overseas conscription. Quebec felt that the pledges had been made to it rather than to the nation as a whole, and 72% of its votes was adverse. The country as a whole was favourable, and King announced that as yet he would not make use of this development. Some of his French Canadian leaders, notably P. J. Cardin, abandoned him in May when he asked parliament to modify the mobilization law; but when this was done they stated that they would not resist the new statute. The torpedoing of ships by the Germans in St. Lawrence waters had some influence; but Maxime Raymond, an eloquent national deputy of Montreal, organized a Bloc Populaire advocating complete autonomy for the province. At the end of the year King brought three new French Canadians into his cabinet.

Many French-Canadian military units showed great courage and loyalty in combat in Europe. During 1943 the Quebec legislature and the Quebec deputies at Ottawa both gave proof of devotion to King's war policies, although also opposing conscription; and the dominion laws providing a species of labour conscription were not resisted. The Roosevelt-Churchill conferences at Quebec were well received. A very large share of Canada's war supplies was produced in Quebec. The vast Shipshaw hydroelectric plants on the Saguenay commenced to operate, and the Sorel shipyards built large freight vessels. Nevertheless the forces of local Nationalism showed revival, and the Bloc Populaire scored a few by-election victories. The uneasiness

was increased by important Montreal strikes, adjustment of which proved painful.

National Union Government—Second Phase.—In the spring of 1944, Premier Godbout took over the Montreal Light, Heat & Power company, and arranged for a provincial hydroelectric commission, which should have enhanced the government's popularity with the voters. But the extinction of submarine activities and the Allied invasion of France created a feeling that the war danger was over; so that when a provincial election was held, on Aug. 8, the Duplessis party, stressing the conscription and provincial rights issues, was able to capture 48 seats of 91, and to assume control of the province. In December Mayor Houde was re-elected at Montreal.

Nevertheless, when Prime Minister King finally resorted to conscription in the autumn of 1944, the consequences in Quebec were less violent than might have been anticipated. Some Liberal leaders bolted or refused office, and there were a few popular disturbances, but as compared with the riots during World War I on the same issue, the reaction was very moderate. The mildness of King's strategy toward the province was even more apparent in 1945, when the national elections held in June gave him 60 of the 65 Quebec federal members and also marked the final exit of the Bloc Populaire. At the end of the year Duplessis had increased his hold on the provincial government through by-elections, due to his opposition to increased constitutional power for the central government; but he

made no headway as to dominion politics.

An outstanding development in 1946 was the enactment of a Quebec law for the exploitation of the extensive iron ore deposits of Ungava, said to be larger than those of the Mesabi range in Minnesota. The economic expansion continued in general with great vigour. At Ottawa the Quebec deputies showed resentment at proposals for the inclusion of British heraldry in the suggested new Canadian flag; but in other matters they supported the Liberal government of Premier King as being more sympathetic to their province than other governments were apt to be. (A group of young Liberals led at Ottawa by Rinfret and at Quebec by Arsenault gave promise of revitalizing their party.)

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Quebec Conference

See INTERNATIONAL CONFERENCES, ALLIED (WORLD WAR II).

Queensland

The northeastern state of the Australian commonwealth, Queensland has an area of 670,500 sq.mi. and 3,236 statute mi. of coast line. The area of the state represents 22.5% of the Australian continent, and the occupied area 30% of the Australian total. Altogether less than 11% is unoccupied territory either for private production or for public reserves, and this is situated mainly in the north of Cape York peninsula. The area within the tropics is 360,000 sq.mi., this being 54% of the whole. Pop. (Census 1933) 965,234, (estimate 1946) 1,090,300. Chief towns: Brisbane (cap., pop. 1945, 384,500); Townsville (36,500); Rockhampton (34,000); Toowoomba (32,000); Ipswich (25,500).

An unrestricted adult franchise was adopted within the state for both the parliamentary and municipal institutions. The Queensland parliament, alone among state legislatures in Australia, continued to have only one house—the legislative assembly of 62 members. The

Quebec: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain . . .		4.867 Canadian \$ = £1		4.45 Canadian \$ = £1		4.45 Canadian \$ = £1
United States . . .		1 Canadian \$ = 99.4¢		1 Canadian \$ = 90.9¢		1 Canadian \$ = 90.9¢
Finance						
Provincial revenues .	£11,450 (\$55,977)		£24,898 (\$100,387)		£23,405* (\$94,439)	
Provincial expenditures . . .	£10,838 (\$52,986)		£20,169 (\$83,136)		£24,351* (\$98,255)	
Transportation						
Railroads		4,853 mi.		4,789 mi.		4,784 mi.
Highways		35,127 mi.		38,470 mi.†		41,952 mi.†
Communication						
Telephones		300,141		349,372		397,245
Telegraph lines . . . .		...		...		7,032 mi.†
Radio sets		268,650		346,328		456,825†
Minerals						
Gold		881,263 oz.		1,089,339 oz.		746,784 oz.
Copper		56,323 tons		71,892 tons		50,403 tons
Asbestos		289,793 tons		§		419,265 tons
Cement		2,730,320 bbl.		3,854,339 bbl.¶		3,249,302 bbl.
Sand and gravel		12,523,404 tons		12,177,624 tons¶		8,541,400 tons
Crops						
Hay and clover		5,238,000 tons		3,755,000 tons		6,774,000 tons‡
Oats		616,000 tons		750,000 tons		608,000 tons‡
Potatoes		558,000 tons		588,000 tons		507,000 tons‡
Turnips		369,000 tons		339,000 tons		257,000 tons‡
Livestock						
Cattle		1,809,000		1,758,000		2,012,000‡
Sheep		670,000		526,000		649,000‡
Swine		645,000		808,000		844,000‡
Horses		289,000		333,000		314,000‡
Forest products						
Wood pulp		1,858,971 tons		2,971,386 tons		2,767,081 tons
Paper		1,635,317 tons		2,361,487 tons		2,152,956 tons
Lumber		724,652,000 ft. board measure		914,691,000 ft. board measure		1,010,361,000 ft. board measure
Manufactures—Total .	£211,665‡ (\$1,046,471)	...	£226,412‡ (\$1,004,137)	...	£642,539‡ (\$2,592,643)	...
Pulp and paper . . .	£21,613‡ (\$106,853)	...	£22,422‡ (\$99,443)	...	£37,725‡ (\$152,221)	...
Nonferrous metal smelting and refining	£14,118‡ (\$69,800)	...	£18,621‡ (\$82,582)	...	£58,492‡ (\$236,015)	...
Railway rolling stock	£9,165‡ (\$45,314)	...	£5,480‡ (\$24,303)	...	£19,436‡ (\$78,423)	...
Cotton yarn and cloth	£10,076‡ (\$49,815)	...	£10,647‡ (\$47,219)	...	£21,530‡ (\$86,872)	...
Education Enrolment						
Public schools . . . .		...		607,164		579,282‡
Private schools . . .		66,360		59,554		67,553‡
Dominion Indian Schools		1,742		1,519		1,459
Universities and colleges		39,575		35,619		46,261
*Provisional figures. ‡1937. †1939. ‡1943.	†1942. ‡1943.	†1945.	§War restrictions precluded publishing detailed data.	¶1940.		

state cabinet consisted of ten ministers of the crown, forming the executive government and presided over by the governor, the king's representative.

During the decade 1937-46 the king's representative in the state was the Right Hon. Sir Leslie Wilson. A Labour government was returned to power at general elections held in 1938, 1941 and 1944, the consecutive premiers during this period were: W. Forgan Smith, who resigned in Sept. 1942; F. A. Cooper (Sept. 1942-March 1946); E. M. Hanlon (after March 1946).

The Queensland government, mindful of the disastrous effects upon local employment following the world slump in 1929-32, instituted in 1933 a program of public works and development which brought about a general improvement in employment figures throughout the state. An important extension of these plans took place in 1938, when the state parliament passed the State Development and Public Works Organization act designed further to encourage and stabilize employment by marshalling and co-ordinating the organization and control of public works and constructional utilities, and thus instituting a progressive system of public works and state development.

After the outbreak of war in 1939, the Queensland government, under the national safety regulations, applied measures to ensure that adequate supplies of essential commodities would be available throughout the state in the event of any interruption to transport either by sea or land, or through dislocation of trading facilities generally.

The state government gave all possible aid to the government of the Commonwealth of Australia in the prosecution of the war; particularly was this the case after the entry of Japan into the world conflict, when the vulnerable coast line of the state became the object of an attack by the Japanese sea and landing forces. At this critical time the Queensland government subordinated all other questions to the supreme purpose of co-operating with the commonwealth government in the war effort, by undertaking the construction of inland strategic roads, preparing and laying down sites for aerodromes, airfields storage depots and munition factories, improving dockyards and harbours, and by training munition workers, etc. Acts of parliament, regulations and orders were also promulgated for the welfare, order and public safety of the state and of its people.

Queensland, because of its geographical position, actu-

Queensland: Statistical Data

Item	1938		1941		1945	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
Great Britain		£A 1.25-£1		£A 1.25-£1		£A 1.25-£1
United States		£A 1 = \$3.895		£A 1 = \$3.198		£A 1 = \$3.198
Finance						
State revenues	£13,814* (\$67,535)		£17,085* (\$68,885)		£20,987* (\$84,578)	
State expenditures	£13,996* (\$68,427)		£17,062* (\$68,792)		£20,535* (\$82,758)	
State debt	£100,209* (\$489,921)		£103,185* (\$416,041)		£104,299* (\$420,323)	
Transportation						
Railroads		6,567 mi.		6,567 mi.		6,566 mi.
Highways		37,953 "		42,665 " †		...
Communication						
Telephones		77,929		88,722		106,872
Telegraph lines		14,718 mi.*		14,779 mi.* †		15,194 mi.*
Radio sets		133,217* †		168,216*		180,089*
Minerals						
Gold		151,432 oz.		109,064 oz.		62,838 oz. \$
Coal		1,113,426 tons		1,454,024 tons		1,699,521 tons \$
Lead		41,196 "		...		8,579 "
Zinc and concentrates		23,735 "		...		5,077 "
Silver		3,533,490 oz.		...		775,072 oz. \$
Crops						
Sugar cane		5,132,886 tons		5,180,868 tons		3,397,617 tons †
Wheat		112,683 "		170,510 "		152,529 "
Hay		98,218 "		111,746 "		963,103 "
Corn		73,584 "		124,432 "		126,329 "
Pineapples		1,311,091 doz.		2,381,895 doz. †		2,000,844 doz. †
Livestock						
Sheep		23,158,569		25,196,245		21,365,778 †
Cattle		6,097,089		6,303,467		6,624,799 †
Horses		444,521		431,363		380,670 †
Swine		325,326		435,966 †		438,088 †
Sea products						
Fish		4,409 tons		4,128 tons †		3,772 tons †
Crabs		13,384 doz.		16,646 doz. †		13,402 doz. †
Oysters		526 tons		555 tons †		223 tons †
Pearl shell		1,118 " †		1,187 tons		...
Manufactures						
Total	£14,791 † (\$65,598)	...	£18,982 † (\$76,592)	...	£22,967 † (\$92,672)	...
Food, drink and tobacco	£5,714 † (\$25,341)	...	£7,322 † (\$29,543)	...	£8,131 † (\$32,808)	...
Industrial metals machines, imple- ments, etc.	£3,790 † (\$16,807)	...	£5,400 † (\$21,788)	...	£8,087 † (\$32,632)	...
Woodworking and basketware	£1,547 † (\$6,863)	...	£1,853 † (\$7,477)	...	£2,048 † (\$8,264)	...
Paper, printing and binding	£979 † (\$4,343)	...	£910 † (\$3,671)	...	£953 † (\$3,847)	...
Education						
State schools		1,693		1,660		1,548 †
Enrolment		141,505		138,358		128,832 †
Teachers		4,261		4,401		5,142 †
Private schools		231		225		219 †
Enrolment		34,390		35,613		35,252 †
Teachers		1,591		1,561		1,421 †
Universities		1		1 †		1 †
Enrolment		1,405		1,305 †		1,789 †
Teachers		121		266 †		258 †
Technical schools		14		13		...
Enrolment		16,388		6,393		...
Teachers		492		221		...

*Year ending June 30. †1940. ‡1943. §1944.
 †Crushed weight. ‡Year ending March 31. §1942.

ally became the eastern bastion for the defense of the Australian continent as a whole. As a result, the state was called upon to play an all-important part in General Douglas MacArthur's plans for the defense of the commonwealth and the eventual attack upon the Japanese-held bases. The headquarters of the American forces were located in Brisbane in the early stages of the campaign in the southwestern Pacific.

(L. H. P.)

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Quercitrin

See CHEMISTRY.

Quezon, Manuel Luis

Quezon (1878–1944), Philippine statesman, was born Aug. 19, 1878, at Baler, Luzon, P.I., and studied law at Santo Tomas university in Manila. In his early 20s, he joined the Aguinaldo insurrection against the U.S., but later made his peace with the territorial authorities and became a provincial prosecutor in 1903. He was a member of the Philippine assembly, 1907–09, and resident commissioner to the U.S. congress, 1909–16. He was elected president of the Philippine senate in 1916, a post which he held until his election as president of the new commonwealth in Sept. 1935. Quezon was re-elected in 1941 by an overwhelming majority. After the Japanese invasion of the Philippines, Quezon reaffirmed his loyalty to the U.S. In May 1942 he established a provisional government for the commonwealth-in-exile in Washington, D.C. Although he was scheduled to step down from the presidency after his second term, as the commonwealth constitution limited the tenure of the president to eight years, the U.S. congress voted in 1943 to have him continue in office until civil government was restored to the islands. Quezon died at Saranac Lake, N.Y., Aug. 1, 1944.

Quicksilver

See MERCURY.

Quisling, Vidkun Abraham

Quisling (1887–1945), Norwegian politician, was born July 18, 1887, at Fyrisdal, Norway, and was trained from his youth for a political career. After passing the Norwegian college examinations, 1911, he entered the army, was commissioned as a captain and promoted to a major of field artillery. He pursued a diplomatic career, as military attaché at Petrograd, 1918–19, and Helsinki, 1919–21. In May 1933, four months after Adolf Hitler became chancellor of Germany, Quisling formed the *Nasjonal Samling*, a Norwegian fascist party. He assisted the German invasion of Norway of April 1940 by using his military authority to delay mobilization and surrender certain key positions and by urging his countrymen not to resist the nazis. Hitler rewarded Quisling for his aid by making him, on Sept. 25, 1940, fuehrer of Norway. His task, the German occupation forces proclaimed, was to “reconstruct” his country in conformance with nazi principles. Quisling, who became prime minister in Feb. 1942, was never able to command the co-operation of Norwegian authorities; his treason was despised by most of his countrymen. Arrested after the Allied reoccupation of Norway in 1945, he was tried on charges of treason before an Oslo court in sessions that lasted from Aug. 20 through Sept. 10, during which the puppet leader denied the treason charges and contended he was the “saviour” of Norway. The seven-man trial court found Quisling guilty on Sept. 10, 1945, on numer-

ous counts, including murder, treason and theft, and sentenced him to die before a firing squad. The man whose surname had become a synonym for traitor, was executed Oct. 24 and his body was cremated immediately thereafter.

Rabies

See VETERINARY MEDICINE.

Races

See AIR RACES; AUTOMOBILE RACING; CYCLING; DOG RACING; HORSE RACING; TRACK AND FIELD SPORTS.

Radar

Though it was as early as 1886 that Heinrich Hertz discovered that radio waves were reflected from solid objects, modern methods for the use of such reflections in detection of ships and aircraft originated with experiments to measure the height of the ionosphere—the layer of ionized gases in the upper atmosphere which reflects radio waves of long and medium length downward and permits them to travel around the earth.

In the summer of 1925, Dr. Gregory Breit and Dr. Merle A. Tuve, of the Carnegie Institution of Washington, began to use radio pulses for such measurements. Each pulse lasted a thousandth of a sec., during which it could travel 186 mi. It was shown by a hump in a line of light on the face of a cathode ray oscillograph. A fraction of a sec. later the echo returned and was similarly indicated. With speed of propagation being known, the distance to the ionosphere was determined. The advantage of the pulse method over a continuous wave was that the faint echo, was not overpowered by the radiation from the transmitter. A continuation of these experiments in 1938 used a pulse less than 0.004 sec. in length, repeated 300 times per sec. so that the silent period was about eight times the length of the pulse.

In 1922 Dr. A. Hoyt Taylor and Leo C. Young, at the Naval Research laboratory, had noticed a distortion in reception of radio signals caused by reflections from a steamer on the Potomac. This led to a suggestion to the navy department that “destroyers located on a line a number of miles apart could be immediately aware of the passage of an enemy vessel between any two destroyers of the line, irrespective of fog, darkness or smoke-screen.”

During experiments with radio direction finding equipment in the summer of 1930, Taylor and Young observed similar effects with an aeroplane, and a project to apply radio methods to the detection of ships and aircraft was started at the laboratory. This method functioned through the interference of the direct with the reflected wave, when both arrived at the receiver. It was necessary that the transmitter and receiver be some distance apart, thus limiting its application, particularly on shipboard. It seemed, however, suitable for land installations and the army was informed of the work in 1932.

Young had taken part in the 1925 ionosphere experiments, and late in 1933 he proposed that the same method might be a solution to the problem of placing receiver and transmitter on the same ship. During the next few years, with the aid of an appropriation of \$100,000 by congress in 1935, work continued at the laboratory. Circuits to generate pulses of the proper length and shape, sensitive receivers, methods of displaying the data on cathode ray tubes and a duplexer, which permitted the same antenna to be used both for receiver and transmitter, were developed.

The resultant equipment was demonstrated at the laboratory in June 1936, to representatives of the navy's bureau of engineering, and its success led to another demonstration on Feb. 17, 1937, to Charles Edison, then asst. secy. of the navy, and Adm. Leahy, chief of naval operations. During 1936 the army signal corps laboratories had designed and built their first equipment using pulses and had detected commercial aeroplanes flying over New Jersey. In May 1937 a demonstration was given to the secretary of war and members of congress at Fort Monmouth. In addition to detection of the test bombers, it gave information about direction, elevation and range, so that searchlights could be aimed accurately at the planes.

The first shipboard system was installed by the Naval Research laboratory in Dec. 1938 on the U.S.S. "New York." Exhaustive tests were made during battle manoeuvres early in 1939. Both the commanding officer of the "New York" and the commander of the battleship division were so enthusiastic about the results that full support to continuation of the program was forthcoming. In Oct. 1938 the first contract to a commercial firm was awarded when six additional sets, duplicates of the "New York" installation, were ordered from a large radio manufacturer.

Meanwhile, the British had developed their own system, very similar to that of the U.S. navy. This, too, had resulted from publication of the early Breit-Tuве experiments. At the National Physical laboratory, by 1935, a similar technique was in use for measuring the ionosphere and Robert Watson-Watt, head of the radio department conceived the idea that aeroplanes might be detected by similar methods. An experiment with radiation from the high-power station at Daventry gave encouragement, and in Dec., 1935 it was decided to establish a chain of five stations on the east coast of England, the first operational radar system in the world. In Aug. 1937, 15 additional stations, covering the whole east and southeast coasts, were authorized.

At the same time, also springing from the ionosphere measurements, experiments were being carried on in Germany. As in all countries which were developing such devices, they were conducted under a heavy cloak of secrecy.

By 1940, as U.S. defense activities were accelerated, work in aircraft detection shared this expansion. Co-operation among various arms of the service in their developments, and also among scientists in the United States and Great Britain, was effected. The U.S. navy had coined the word "radar" (for "radio detection and ranging") to designate the work, and this soon replaced other terms, such as "radiolocation" and RDF (radio direction finding), used in Britain, and RPF (radio position finding) which had been used by the army signal corps.

Another important step was made in June 1940 when the National Defense Research committee (NDRC) was set up by executive order, with Dr. Vannevar Bush at the head. Long-range research problems in radar were turned over to this group, which worked through university and industrial laboratories. By July 1940 a Microwave committee was formed, under Dr. Alfred L. Loomis as chairman, to work on the problem. In Sept. 1940 a British Technical mission, headed by Sir Henry Tizard, arrived in the United States, and mutual disclosures were made of U.S. and British work. The Americans were shown the British-developed cavity magnetron, an electronic tube for the production of short wave radio pulses at high power, and

soon equivalents were made in the United States.

A conference on Oct. 12, 1940, between members of the British mission and the Microwave committee started what was to be one of the most important radar accomplishments in America. Up to that time radar had used waves of the order of length of a few ft. but now it was decided to undertake intensive developments in the microwave region—with waves only a few in. in length—particularly in respect to a system for aiming anti-aircraft guns, and another for aircraft interception.

As a result there was established at the Massachusetts Institute of Technology a new Radiation laboratory, staffed by physicists from many universities, and headed by Dr. Lee A. DuBridge, of the University of Rochester. This was administered by the institute under a contract from the NDRC. The laboratory opened its doors in Nov. 1940 and soon became the chief centre of long-range radar development. Early in 1941 its personnel had grown to nearly 4,000. By the end of June the first contract had been awarded for commercial production of microwave radar equipment, but it was not until 1943 that microwave sets of many types were being turned out on a large scale and were beginning to have an important operational role. By the end of the war these techniques were employed in most of the Allied radar equipment and were largely responsible for its superiority over axis radar.

In the meantime the U.S. army and navy, in their own laboratories, were concentrating on the urgent problem of getting radar into use on land and sea. Sets using medium length waves were installed on many ships and at a number of land stations. One of these sets, at Pearl Harbor, actually detected the approach of the Japanese planes on Dec. 7, 1941, at a distance of 135 mi., and it was no fault of the equipment that its warning went unheeded.

When attacks on England by the luftwaffe began in Aug. 1940 the British chain of radar stations clearly demonstrated its value. The R.A.F., critically short of fighter planes and pilots, was unable to maintain constant patrols around the island to combat the Germans. By radar, however, the German raids could be detected well in advance and the few to whom so many owed so much could be used with the most effect. Nazi losses increased, so night attacks replaced daytime raids.

With daytime attacks, the defending fighters were brought into the general vicinity of German planes and each pilot then used his own judgment for a choice of targets. At night, however, a radar operator on the ground would follow a specific nazi plane and give radio instructions to the fighter which he controlled until he was a few mi. behind the target. Then, by a radar on the plane itself, the pilot would be guided close to his quarry and the attack was completed. Sometimes one radar controller, in a single night, would be responsible for the destruction of as many as six German planes.

* * *

AN IMPORTANT ADJUNCT to radar was IFF (identification, friend or foe). This enabled the radar operator to tell, by means of a return signal from a special transmitter on the plane, whether the approaching plane was a friend or an enemy. Later it was extensively developed—for use on ships as well as aeroplanes.

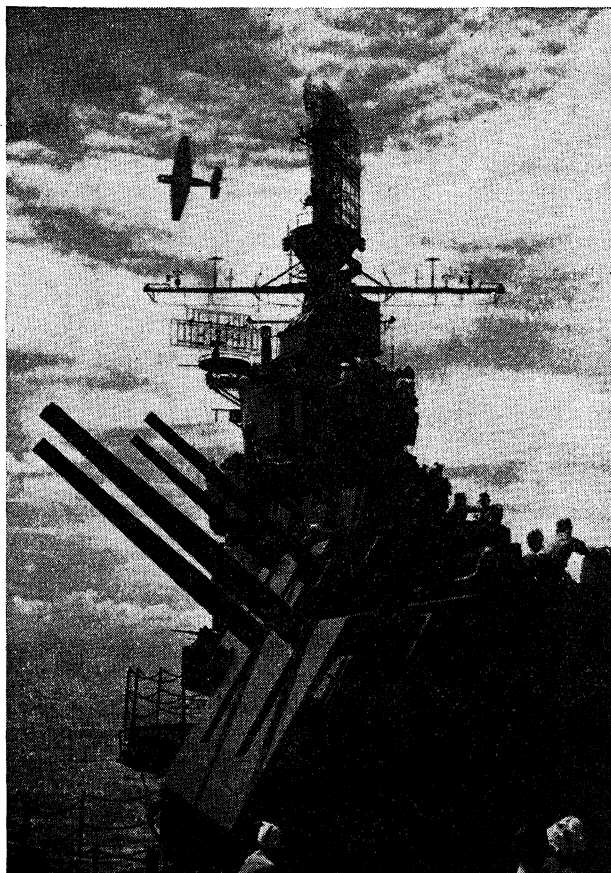
During World War I, sound locators were used for locating approaching aircraft, which would then be picked up by optical range finders and tracking telescopes. At night the plane would have to be picked up on the beam of a searchlight before the optical equipment could be used and anti-aircraft guns aimed. As the approach of

World War II brought faster and faster planes this method became quite inadequate. Radar took the place of the sound locators, but still the data obtained had to be fed to the computers controlling the guns. By 1943, however, as a result of extensive research and industrial co-operation, the army had developed a microwave radar which could aim the guns automatically. This was used in conjunction with a new type of electronic computing device, which made the necessary allowances for such factors as the movement of the plane while the projectile was in flight. It controlled the motors moving the guns and also set the fuse on the shell to explode at the right time. The over-all result was anti-aircraft artillery of a new order of accuracy.

This combination proved most effective against V-1, the "buzz bomb," which the Germans began to send over England in 1944. Some were caught by the balloon barrage. Others were shot down by fighter planes, though only the fastest could catch them. Radar showed the presence of V-1s and also permitted a plot of their paths back to the launching sites, which could then be destroyed by Allied bombing. But finally anti-aircraft artillery, guided by radar through the electronic gun director, shot down the bulk of the buzz bombs. The same equipment was also used effectively both against V-1 and manned aircraft following the Normandy invasion, though by that time the luftwaffe was considerably weakened.

In the Pacific similar equipment was effectively used against Japanese planes and naval radar also demonstrated its effectiveness. In one early case of night action in the Solomons, a U.S. battleship was able to locate and sink a

U.S. carrier with radar antennae visible against the sky. Radar fire control directed the fire of the 5-inch anti-aircraft batteries in the foreground, and fighter director radar guided the carrier's planes to enemy targets



Japanese ship eight mi. away at night, although the ship was not visible until actually on fire.

Various kinds of antennae were used for radar. Early medium-wave sets used an array of elements arranged on what looked like a large bed spring, but this gave rather a wide beam. As microwaves came into use the antenna was placed at the focus of a parabolic metal reflector, which had the same function as the silvered glass mirror of a searchlight. The fineness of the beam depended on the size of the reflector relative to the wavelength. Longer waves could be focussed in the same way but the reflector would have had to be unduly large. With microwaves it was a simpler matter to get a narrow beam. This increased the precision of the apparatus, and also concentrated the energy, giving longer range. In most sets, the same antenna served both as transmitter and receiver. A device called a T-R (transmit-receive) box disconnected the transmitter when the echo returned, and fed the signal into the receiver.

To present the data obtained, cathode ray oscillograph tubes were generally employed. These were similar to the tubes used in a television receiver. The tube was pear-shaped; in the narrow part was a source of electrons which were fired at the wide end, coated on the inside with a fluorescent material which glowed where electrons strike.

The A-type of presentation was one of the earliest. For each pulse sent out, lasting a few millionths of a sec., the electron beam traced a horizontal line. At the left-hand end, a vertical hump appeared, representing the transmitted signal. A returning echo produced a second hump, or "pip," its distance from the first indicating the range of the target causing the echo. Another, the B-type presentation, showed the azimuth of the plane by the horizontal position of a spot, while its height on the face of the tube indicated range.

One of the most useful of all, however, was the PPI (plan position indicator) which, in effect, drew a map of the region around the radar—perhaps to a distance of 100 mi. or more—and showed in their proper position all targets within range, as well as topographical features.

The antenna on the radar would sweep around the horizon, every few secs. A fine radial line of light, traced by the electron beam, would sweep around the face of the tube in synchronism. Several hundred times a sec. the pulse would go out, and when an echo returned the radial line would brighten at a distance from the centre proportional to the actual distance of the reflecting plane or ship. The phosphor with which the tube was coated was phosphorescent so that even though the fainter glow from the line itself quickly faded, that from the target would continue until the line swept past again, when it would be renewed. Thus, as a plane came into range, the spot would be seen moving across the face of the PPI scope in a way that corresponded with the actual movement of the aircraft in space. In many sets, the range was adjustable. At first the PPI might be used to detect planes at 100 mi. or more, then as the targets approached, a turn of a switch would shift to a shorter range, which would show the region around the set on a larger scale.

This type of presentation was used on land sets, marine installations, and from the air. In addition, for airborne sets, there was another type which in effect gave the flier a window through which he could look straight ahead, even in total darkness or through clouds, and see other planes in that region. The radar beam would sweep through a rectangular area forward, and the scope would show the re-

flections, with positions corresponding to their actual places. An ingenious addition to such sets was the "winged pip". That is, the spot of light showing the presence of a reflecting object was made, by electronic circuits in the receiving set, to grow "wings," a little horizontal appendage on each side. The length of these wings would increase as the range decreased, thus giving a quick means of determining distance. When the wings had grown to the correct size, as indicated by vertical lines on the face of the scope, and when it was exactly centred, the other plane would be at correct range; the guns were then properly aimed, and fired with the virtual certainty of a hit.

* * *

SOME of the most remarkable aerial achievements of radar were with radar bombing, also known as BTO ("bombing through overcast"). After British experiments with a modification of equipment which had been intended to enable planes to search for ships at sea below them, and which showed possibilities of the method, Radiation laboratory scientists developed a set using shorter waves, and hence giving greater precision.

The beam from an antenna in a parabolic reflector would scan in a conical region centred directly below and the presentation was on a PPI scope. In general, land areas reflected radar pulses better than water and building and other structures produced characteristic effects. Thus, the radar scope showed a virtual map on which coast lines, rivers, bridges and other features could be identified with ample accuracy to aim bombs.

After the U.S. army air forces requested such sets in June 1943 Radiation laboratory undertook, with army and navy help, to build 20 outfits on a "crash" basis. These were completed and received their first operational test on Nov. 3. Nine "pathfinder" planes of the 8th bomber command, each equipped with BTO took off on a "practice" run over Germany. Each led a combat wing of 60 planes. They went over Wilhelmshaven, a target which had been missed on eight previous raids, guided only by visual aiming methods. Even though the target was completely hidden by clouds, the bombs were accurately dropped by radar aiming, a point confirmed by later reconnaissance photographs.

During the rest of Nov. 1943 the 8th air force made more raids than ever before in a single month and in December dropped the greatest tonnage of bombs (24,000) ever dropped in a similar period—a marked contrast to the previous December, during which it had been grounded. In this whole period of two months, there were only four raids during which weather over the target permitted visual aiming; all the rest were radar guided, the bombing formation flying behind a few Pathfinder planes.

Though radar permitted bombing under weather conditions which formerly would have prevented any bombing at all, it was not as accurate as visual aiming. This was finally recognized in the adoption of techniques, which permitted the visual bombardier to aim if he could but held the radar operator ready to take over if necessary. The method was described in *Radar: A Report on Science at War* (1945) as follows:

"A technique for coordinating the work of the B.T.O. operator and bombardier was worked out so that every mission, no matter how the bombs are aimed, is run in the same way. Radar is always used for every run to navigate to the initial point and to get squared away for the bomb run. The radar operator goes on as if he were going to do

the whole job, and the optical bombardier keeps his sight lined up according to the radar set-sighting. This means that, if the radar is right, the telescope of the Norden is always kept pointed at the aiming point, which is down there below the clouds. The slightest break in the under-cast which permits the bombardier to see enables him to take over the run and complete it optically. This system joins the best features of radar and visual bombing, and makes the bombardier and radar operator a team instead of competitors."

By the end of the war, radar sets in a wide variety of sizes and types were being made and used. Some of the largest and most elaborate naval sets weighed many tons and gave range, altitude and other data about planes detected. Smaller, more compact sets were built which could be floated ashore in an invasion and quickly set up on shore. Others were mounted in trailer trucks, which could speedily be moved around, while still others were permanently mounted in harbour installations. A simple and small airborne set was installed in the tails of fighter planes to give warning by means of a bell or flashing light of any plane approaching from the blind region directly behind. And closely related to radar were sets used as proximity fuses in anti-aircraft and artillery projectiles. These did not need to hit to explode. The fuse contained a miniature radio transmitter which sent out a signal. When a reflection came back from a certain distance (or from the ground) the shell exploded.

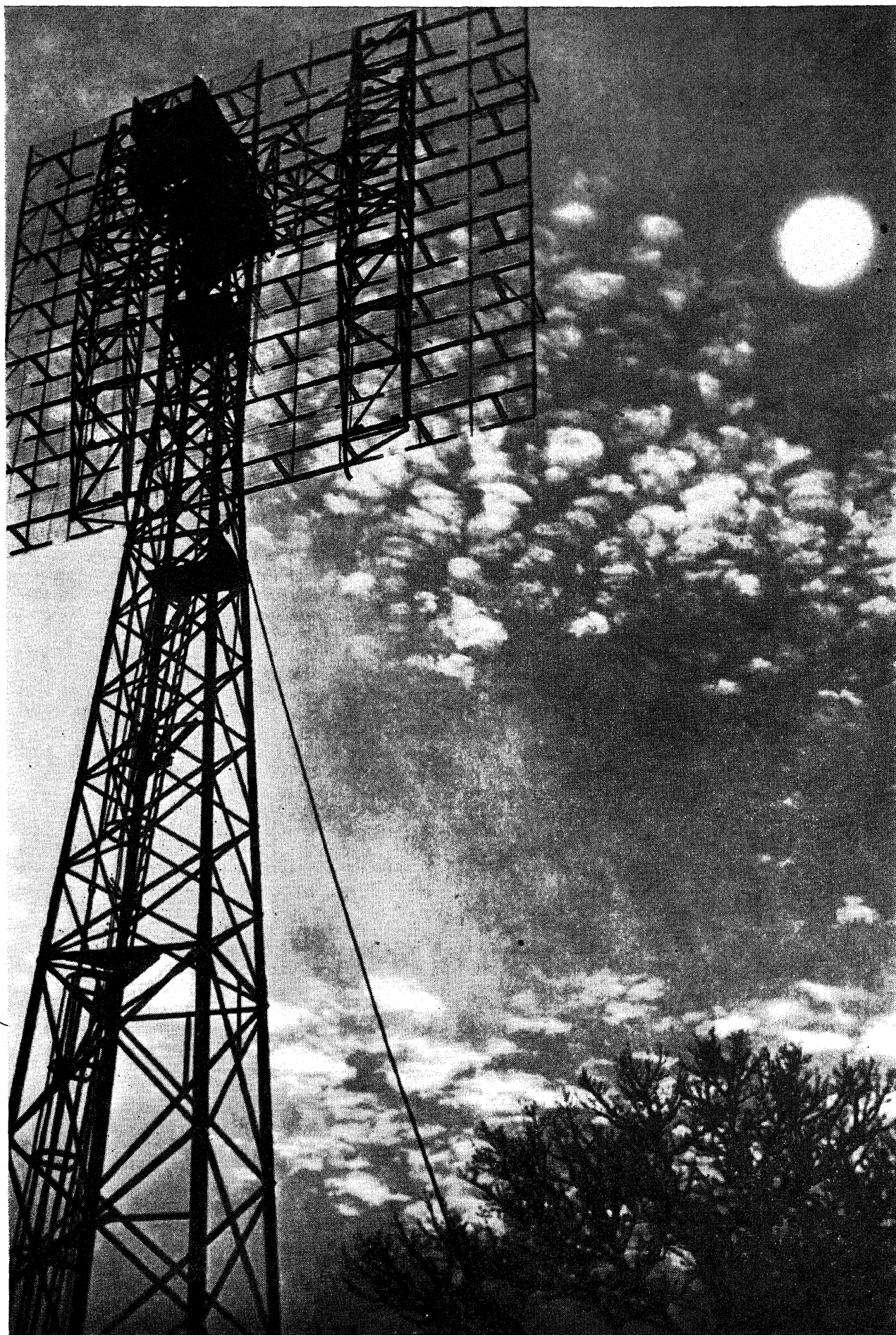
Not strictly radar but closely related to it, were the various kinds of radio beacons. These worked by methods similar to the IFF equipment on aeroplanes. That is, the radar pulse from an airborne transmitter would trigger off a beacon transmitter on the ground and the return signal produce a characteristic indication in the radar scope. This would be coded so that the aviator could identify the responding beacon.

Then there was Loran (for "long range navigation") which was set up around the world and proved a valuable peacetime guide to navigation, both air and marine. This was developed in the Radiation laboratory, independently of a British system using the same general principles. The latter, however, used shorter waves and was not applicable over very great distances. Loran, however, used wavelengths comparable to those for transoceanic broadcasting, and operated over distances of 1,000 mi. or even more.

Loran stations operated in pairs—a master and a slave. First the master sent out a pulse travelling in all directions, to a ship at sea and also to the associated slave. Here a transmitter was automatically triggered and a second pulse was emitted, which also went to the ship. On the vessel there was a special receiver which picked up both pulses and showed on a cathode ray oscillograph screen the difference in time of arrival, automatically compensating for the delay while the master signal was reaching the slave and triggering it off.

If the two signals, after this allowance, arrived simultaneously it showed that the ship, or plane, was on a straight line half way between the two transmitters and at right angles to the line joining them. If one signal arrived at two-thirds of the time required for the other, then the ship was some place along a curved line—a hyperbola—where this ratio of distance was the same. Thus, one might draw a family of such curves on a map of the area around the

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"Contact" with the moon was first established on Jan. 10, 1946, when a radar signal beamed at the moon from U.S. signal corps laboratories at Belmar, N.J., echoed back in 2.5 seconds. Similar methods were expected to be used for charting the topography of distant planets



stations and, by loran observations, the ship's navigator could accurately place his craft on one of them.

This would not show where he was, since part of the proper curve might be on land. However, if there were another pair of stations nearby, their master and slave pulse could also be received and the ship would then be placed on a curve drawn with respect to them. The intersection of the two curves, then, was the position of the ship and this could be given with accuracy as great as from observations of celestial bodies. Kept highly secret during the war, loran charts prepared by the navy were made available for navigators after the war's end, and the equipment was being made commercially, so that these methods—often referred to as "hyperbolic navigation"—might become a common procedure for commercial ships and aircraft.

Radar Countermeasures.—The introduction of any new weapon always brings up the matter of countermeasures, and quite early in World War II some slight preliminary consideration had been given to methods by which radar, if used by the enemy, could be countered. But this research did not have very high priority. Then, early in 1941, the British had the German battle cruisers "Gneisenau" and "Scharnhorst" safely (as they supposed) bottled up in Brest harbour.

British radar along the channel coast and on ships could presumably detect an attempted escape even under cover of fog.

But on Feb. 11, aided by such protection, the ships did escape by "jamming" the British radar.

This feat emphasized the importance of radar countermeasures, referred to as RCM, and an active program began. At first this took place in Great Britain, because that country was actually at war, but even in the U.S. studies were begun. After Pearl Harbor these activities were accelerated. A group was set up at the Radiation laboratory early in 1942 and charged with responsibility for RCM. A little later, however, it seemed that it could best work as an independent establishment, and it was organized at Harvard university as the Radio Research laboratory, working under the auspices of the NDRC, and with Dr. Frederick E. Terman of Stanford university as director. At first it was under the control of the NDRC division charged with responsibility for radar and the Radiation laboratory. At the end of 1942 a separate part of NDRC, later called Div. 15, was formed. Dr. C. G. Suits, later director of the General Electric Research laboratory, was appointed chief.

The Radio Research laboratory, which was assigned the development of systems, was the largest single group working on the U.S. radio countermeasures program, but important contributions, particularly in the development of new types of electronic tubes, were made by the armed services themselves and by other laboratories, both university and industrial. Under Div. 15, many kinds of axis electronic weapons were countered, but efforts against radar were the most important. About two-thirds of the total of \$31,000,000 expended by the division went into this phase of the work.

Radar countermeasures, more than most wartime scientific developments, were of necessity closely tied in with actual military operations. Just as soon as the axis knew that its radar was being countered, it would try to overcome these measures. Then additional countermeasures were necessary, so there was a constant race between laboratory and axis evasions. This was accomplished by a close co-ordination between the U.S. armed services and

Div. 15. In 1943 a laboratory was set up in England, which was much closer to the scene of operation. Located at Great Malvern, it was close to the Telecommunications Research Establishment, centre of British activities along similar lines.

A still further step was that of counter-countermeasures. Since the Allies were using countermeasures against the axis radar, it could be presumed that the axis would try the same tactics. Therefore, in the design of radar sets, efforts were made to incorporate anti-jamming features that would make them more difficult to jam successfully. This was accomplished by close co-operation between Div. 15 and the Radiation laboratory.

There were four weaknesses of radar which could be exploited in countermeasures. The emitted pulse, even though focussed into a beam, was weakened with distance. The echo from a plane or ship was not focussed but spread in all directions, and so, already much weaker than the original signal, it rapidly suffered further attenuation. Thus, the echo returning to the radar receiver was far more feeble than the pulse sent out. In order to make the echo strong enough to be heard easily the transmitted pulse had to be of tremendous strength and this could be heard by any receiver tuned to the correct frequency. Consequently, a radar set continually advertised itself and could be heard by a "search receiver" at a distance well beyond that at which it could detect an object.

When an operating radar was found, a radio direction finder could be used to determine its direction. If this was done from two separated points, the lines of bearing could be drawn on a map and the position of the radar, at the intersection of these lines, accurately located.

Again, the weakness of the echo returning meant that a louder signal would cover it. In the same way a man listening for an echo of a shout from a cliff might be prevented from hearing it by another man, shouting louder than the echo. To jam a radar echo a transmitted signal did not need to compete in power with the original pulse—it merely had to be stronger than the returning echo. A relatively small box of electronic equipment, carried in a plane, might be able to put a large radar set, weighing many tons, out of use.

The fourth weakness of radar was its inability to distinguish the exact nature of a small target. Radar waves could be reflected by thin sheets of metal foil as well as by aeroplanes, and the indications on the radar scope were similar.

Early in the war both sides seem to have conceived the idea of dropping sheets of foil to give false reflections on the other's radar, but each side was afraid to use it because the other would then learn the secret. Later it was found that thin metallic strips of correct length would resonate to the frequency for which they were cut and thus a relatively small number of strips, dropped from a plane and allowed to scatter in a cloud, could make as much of an echo as a large aeroplane.

These strips were known by the code name of "window," which was first used by the R.A.F. with great success in a raid on Hamburg in July 1943. The losses were only a fraction of those sustained on previous raids. The first window was paper backed but later at the Radio Research laboratory a machine for cutting it from rolls of aluminum foil was devised, which gave it the necessary stiffness by a crease down the middle of the strip. With material so made a bundle weighing less than two oz. scattered through the air would give a radar signal equivalent to that from a large bomber.

The method was to drop a number of packets out of the

leading plane in a formation, either by hand or with an automatic dispensing machine. Hundreds of planes might fly along in the trail produced, and the radar would no longer be able to track them. The cloud of foil acted as an electronic smoke screen which hid them from radar just as a real smoke screen would conceal them from visual detection. During the war a total of 10,000,000 pounds of window were dropped over Europe by British-based U.S. bombers.

* * *

ANOTHER variety of "confusion reflector," known as "rope," consisted of long ribbons of foil and was used largely in the Pacific area. These were attached to small parachutes to retard their fall. Rope was effective over a wider range of radar frequencies than window, which had to be cut for certain particular frequencies, though sometimes packages of assorted sizes were used, so that several different radars might be countered. Since a cloud of window would settle slowly through the air its range, as indicated on the radar screen, would not change; this would enable the operator to distinguish it from the rapidly moving planes. As soon as they would fly out of a cloud of window, they would no longer be protected.

Though it lacked the simplicity of window, electronic jamming was widely used and was even more effective. This consisted in broadcasting a continual program of noise on the frequencies used by the enemy radar, so that it drowned out the indication of the faint echo. On the radar screen, with A-type presentation, this appeared as many fine blades of grass which might completely hide the vertical pips indicating a plane or ship. On the PPI, it made a general brightening of certain areas, covering the wanted reflections in those regions.

One type of electronic jammer, developed at the Radio Research laboratory and known as "carpet," was designed to be used against the German Würzburg radars used to aim anti-aircraft guns. After development of radar bombing methods, enabling raids to be made through clouds which hid the bombers from the ground, the axis was forced to rely on radar exclusively to detect and bring down the planes. In Oct. 1943 carpet was first used in a raid on Bremen. The planes equipped suffered less than half the losses of those not so provided. By the end of the war in Europe, every heavy bomber of the U.S. strategic air forces was provided with at least two radar jamming transmitters. The use of such equipment along with window largely neutralized German radar.

How effectively these measures operated was not appreciated until after V-E day, when interrogation of German personnel, from generals down to actual radar operators, indicated that after countermeasures came into large-scale operations the effectiveness of the radar-controlled anti-aircraft was reduced to 25% of normal.

The frequencies chosen by the Germans for the Würzburg system happened to be about those most susceptible to jamming methods. On the Allied side, the trend was continually to higher and higher frequencies, into the microwave region with waves only a few in. in length. These were harder to jam, and axis countermeasures never offered any serious threat to Allied radar. As early as Jan. 1943 the Germans had recovered a working Allied microwave radar from a crashed bomber. However, they had such a large investment, est. at \$1,000,000,000, in their Würzburg equipment that they bent their major efforts to salvaging it, rather than abandoning it in favour of a new and less susceptible system.

At first the Germans tried to keep their people from

knowing the effects of Allied countermeasures but later the situation became so desperate that the luftwaffe announced a public contest, with prizes amounting to 700,000 RM (to be free of all taxes) for the best solution to the window problem. At least half of their radio experts were engaged in these efforts. Some 13 anti-jamming devices were devised and placed in service, and at least 19 more were under development when the war ended.

One class of device was based on a shift of frequency of their radars to avoid electronic jamming; another was to distinguish between moving and stationary targets, and thus to overcome window. In most cases, it was impracticable to employ both at once. Use of devices against electronic jamming made their radar vulnerable to window, while the anti-window devices failed to protect against the carpets.

"Since all evidence has shown that the effectiveness of German radar-controlled antiaircraft fire against blind strategic missions during the period from Sept. 1944 to May 7, 1945, was approximately 25 per cent of normal," states *Electronics Warfare*, the report on radar countermeasures issued by the Joint Board on Scientific Information Policy, "it can be said that radar countermeasures undoubtedly saved the United States forces in England roughly 450 planes and 4,500 casualties. The cash value of 450 four-engined aircraft alone is approximately \$150,000,000, or about twice the cost of the entire flak countermeasures program. Roughly, the same considerations apply to our strategic Air Force in Italy, whose size was fully half that of its British-based counterpart."

In 1942 a special problem arose in connection with the radar, known as lichtenstein, used by the German night fighters against British bombers. Jammers could not be used on the British planes themselves, for then direction finders on the fighters would locate them as easily as radar could. Accordingly it was decided to install in England a large jamming transmitter 1,000 times more powerful than ever used before in the frequencies involved. This was called "tuba" because of the huge parabolic antenna. With it a jamming beam could be directed over the continent. In this beam British bombers could fly safely back to their bases, knowing that the lichtenstein-equipped fighters that tried to find them would be blinded.

Tuba was built at the Radio Research laboratory, on the basis of a new electronic tube called the resnatron. Originally conceived about 1938 by Dr. David H. Sloan and Dr. L. C. Marshall, at the University of California, it was perfected by Dr. Marshall in the Westinghouse Research laboratories. Its power was of the same order as that of the most powerful U.S. broadcasting stations (50,000 watts), but its frequency was 500 times as high. In June 1944, less than a year and a half after work began, the first installation, carried in seven army trucks, was in operation in England. Later the British ordered two more outfits.

Countermeasures were very effective in the Normandy invasion. Several days before D-day a concentrated attack was made by air against German radar installations all along the channel coast, with bombs, rockets and machine guns. Even so, when the invasion began, a few radars were still operating, and these would have been enough to reveal what was going on. The night before D-day air-borne jammers carried in planes cruising along the English coast jammed the German long-range radars so that they could not detect air squadrons forming over England and approaching the continent.

On the morning of D-day a few Allied bombers flew in

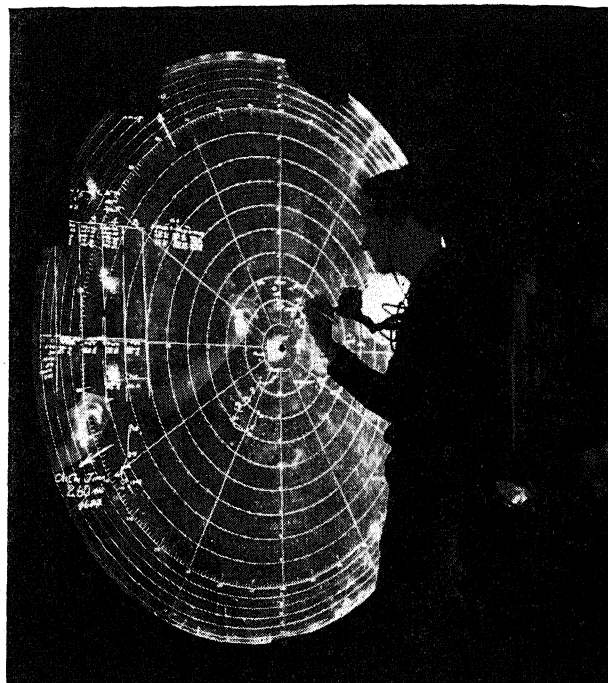
over the Dover-Calais area, using window and electronic jamming to simulate a large raid headed for Germany. This drew a number of German planes into an unsuccessful search to the east of the main invasion forces. There were also naval diversionary forces which approached the French coast just south of Calais, and another south of Dieppe. These ships had special reflectors to increase their radar reflection and make them look much larger. Moreover, enormous quantities of window dropped over them by low-flying aircraft made them seem to radar like one huge convoy. Such tactics caused considerable confusion to the Germans and enabled air-borne troops to land on the Cherbourg peninsula almost without opposition. Similar methods were used later in the invasion of southern France.

In the Pacific, conditions were entirely different, and countermeasures had to be used in quite another manner. There were many invasions, in widely scattered places, and operations were largely naval. Radar countermeasures, therefore, were made a fleet-wide activity, and each ship was given RCM equipment which made it self-protecting. It was operated under direction of the radar officers, who became electronics officers.

For the ship transmitters, the continuous wave magnetron became one of the vital tubes. The original magnetron, in which the flow of electrons was controlled by a magnetic field, had been invented by Dr. Albert W. Hull, of the General Electric Research laboratory, while work in England had adapted it for radar work, where pulse transmission was needed. For RCM, however, transmission had to be continuous, and this imposed severe requirements on the tube. However, in the same laboratory where the magnetron was born it was adapted by Dr. Hull and his associates to this new requirement, and at the end of the war there was a complete line of CW magnetrons covering a wide range of frequencies.

Particularly important in the fleet operations, especially with radar-guided suicide planes, was search and direction finding equipment. This was set to the frequencies used by the Japanese, and worked 24 hr. a day while there was danger of attack. Listening through a pair of headphones, and watching a scope similar to that of a radar set, the operator would sweep back and forth, tuning different frequencies. The sound of a Japanese radar was characteristic. At first it wavered, showing that the enemy was still searching for his target. But then, if it grew strong and steady, it showed he had found it and was coming in for a suicide attack. Then a U.S. night fighter could be sent out to intercept the Jap, since his direction was determined. Since the shipborne radar had much longer range than those on the Japanese planes, he could frequently be detected before he was able to locate his target. If the Japanese plane was not intercepted, and came in for attack, jamming signals could put the pilot's radar out of use, and often he would then give up and return home.

In the B-29 Superforts, planned for use over Japan, space was provided, along with adequate power, for installation of jamming transmitters and search receivers. On some of the first raids in which these planes were used it was found that Japanese anti-aircraft fire through clouds and the night searchlight control was unpleasantly accurate, which indicated the use of radar control and this was confirmed by the search receivers. By the end of the war, every B-29 was equipped with at least one jammer and some had two. They also used large quantities of rope, sometimes as much as 600 lb. being carried in one plane



Radar plotting board on a U.S. carrier during a strike against the Japanese in 1945

on a single mission.

During the day, since these huge bombers flew in close formation, a jammer in each plane was satisfactory, since one could protect the others. At night, however, the B-29s flew about a mi. apart, and if each plane were provided with enough jamming equipment to protect itself, and its immediate neighbours, from all the Japanese radars that might be encountered, the useful bomb load was materially curtailed. As an alternative, jamming gear was mainly concentrated in a few special B-29s, called Porcupines because of the numerous spinelike antenna that projected from them in all directions. Sometimes they would carry as many as 18 jammers in addition to necessary receivers.

As the Japanese radars were of low frequency, with broad beams that covered a wide area, Porcupines did not need to be very close to the other planes to protect them. Thus, they would fly over the target at a greater altitude than the bombing planes, and were safely above flak. Such tactics proved most effective.

Postwar Applications.—For peacetime use, radar had many possibilities. Several electronic manufacturers began to produce a simplified marine radar, with PPI screen, for use on merchant ships. This enabled the navigator, even in fog, to see buoys, nearby ships and features of the coast. A set having similar properties would be equally useful in the air while a very simplified model, such as the tail-warning set used on fighter planes, might be adapted to warn of approach to mountains or tall buildings. Sets on the shore, overlooking harbours, should be useful in detecting approaching ships, under conditions of low visibility, and airports might be similarly equipped.

Equipment for navigation with the use of loran was made available for ships, as already noted, and loran charts were released from secrecy.

For land transport, the application of radar would be considerably more difficult. It could hardly be applied to a railroad, e.g., because reflections from buildings and other structures along the way would produce so much "ground clutter" that the reflection from another train could hardly be identified. Moreover, if two trains were

at opposite ends of a curve, with obstructions in the straight line between them, the signal might be screened. Perhaps, however, an adaptation of IFF, or radar-beacons, might be adapted for such use. One train would be equipped with a radar-like transmitter and receiver, but it would pick up the impulse from another transmitter on the other train, which would be triggered from the first. This might prove useful in preventing collisions.

Possible astronomical uses of radar were suggested in Jan. 1946 when it was announced that the army signal corps had succeeded in detecting a radar echo from the moon, at a distance of about 238,000 mi. This was done with a modified army radar set and a specially built receiver of extreme sensitivity to detect the greatly attenuated echo, which arrived after an interval of about 2.5 secs. These results were mainly qualitative, as measurement of distance was only to the nearest 1,000 mi. However, if the method could be refined sufficiently to give instantaneous determinations of the moon's distance to within a mi. or less it would be a useful aid to astronomers. With the double attenuation of the signal, both on the journey out and on the return, a far higher order of power and sensitivity would be required to secure an echo from even the nearest planet, Venus, which approaches to within approximately 26,000,000 mi.

Radar countermeasures, as such, probably would have slight peacetime usefulness. However, the techniques developed in designing and building RCM equipment showed considerable promise. The pulse transmission of radar had little connection with ordinary radio, such as broadcasting and television. RCM, on the other hand, used a steady signal. Such tubes as the CW magnetron and the resnatron made it possible to produce continuous waves of high power and of far higher frequencies than those used before the war. These could be used for television and FM broadcasting. By opening up a new range of frequencies in the microwave region for exploitation, they might thus make room not only for more broadcasting and television stations, but also for numerous other radio services. In addition, high frequencies at high power might have important industrial applications, e.g., in methods of electronic heating of materials. (See also PHYSICS; STANDARDS, NATIONAL BUREAU OF.)

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Radio

Radio achieved a new and far more authoritative role in world affairs during the decade 1937-46. For the first time, it served as an acknowledged instrument of war. In war and peace, its voice was employed to divert, inform, persuade, or command its listeners, and sometimes to combine these functions, depending upon the nations or persons in charge of programming.

Programming

The most universal trend in specific types of radio programming was the consistent increase in volume of news reports and commentaries, a result first of the spreading international tension and later of World War II itself. In most nations of the world, stations devoted two

and in many cases three and four times as many radio hours to news in 1945 and 1946 as they did in 1937.

Among the major networks of the United States, the Cooperative Analysis of Broadcasting (C.A.B.) reported that the amount of time sold for newscasts, commentaries and talks during the evening hours increased from 9.7% of all commercial time at the end of 1937 to 17.9% during the winter of 1944-45, exclusive of network sustaining newscasts and the time which affiliated and independent stations spent on local news and local summaries of world news. In a survey of stations, *Broadcasting*, the weekly trade journal of radio, found them devoting 15% to 20% of their air time to news at the end of World War II, compared with about 5% in prewar days. Nor was there any perceptible falling off of news time following the end of World War II, as networks and stations sought to acquaint listeners with developments in such fields as peace planning, reconversion, atomic energy and politics. Stations made up in additional local news any postwar reduction in time spent reporting world events.

No comparative data were compiled to show programming trends of the decade according to nations. Roughly, trends in United States radio, where the audiences, as well as the expenditures on programs to inform and entertain them, far exceeded those of any other nation, may be said to have been typical of trends elsewhere. This was particularly true of radio in nations which, like the United States, observed the principle of "free radio" as against government-controlled radio.

Variety programs in 1946 as in 1937 were the most popular type. Quiz shows and other broadcasts with audience participation showed a large "net" gain, although they were accorded somewhat less time in 1945 than in 1941, one of their peak years. Daytime serials, or "soap operas," lost neither in popularity nor in number. On the other hand, the amount of network time devoted to programs of popular music declined steadily, although they still claimed 10% of all network evening commercial time in 1945. Programs devoted solely to classical and semiclassical music lost even more ground, but were on the upswing in 1945 as compared with 1941.

Statistically, programming trends of the decade were reflected in the following compilation of C.A.B. measurements of U.S. network evening commercial time allocations:

Type of Program	Percentage of Total Time		
	1937-38	1941-42	1944-45
Variety	29.8	22.6	27.8
Comedy drama	8.0	10.9	6.7
Straight drama	10.7	12.7	8.9
Melodrama	6.6	7.8	7.8
Audience participation	7.7	14.5	10.0
Classical, semiclassical music	10.0	2.8	4.9
Popular music	14.3	12.6	10.0
Band music	0.5	....	....
Commentators, news, talks	9.7	10.9	17.9
Popular singers	2.6	....	....
Familiar music . . . . .	....	5.2	4.0
Children's programs . . . . .	....	....	1.7
Hymns . . . . .	....	....	0.3

The period covered in each column is from October of the first year to the following April. The figures were prepared by C.A.B. for *Broadcasting's Yearbook*. Each program type was allotted the number of hours which all programs in that type represented. Fifteen-minute programs broadcast five times a week were counted as one and one-quarter hours a week, etc.

During the daytime, the greatest emphasis by all odds was on serial drama (47.3% of all network daytime commercial broadcasts during the winter and spring of 1944-45); for that reason daytime programs need not be broken into categories.

Several shifts in position occurred among the "Top Ten" individual programs during the decade, but many

of those which were in that category in 1937 were still among the leaders in 1946. The following list shows the evening programs at the top of the popularity parade at the end of six of the ten years, as rated by C.A.B. through its polls of listeners:

1937	1939
1. Chase and Sanborn program (Edgar Bergen, etc.)	1. Chase and Sanborn program
2. Jack Benny	2. Jack Benny
3. Major Bowes' Amateur hour	3. Lux Radio Theatre
4. Kraft Music Hall (Bing Crosby)	4. Fibber McGee and Molly
5. Eddie Cantor	5. Kraft Music Hall
6. Lux Radio Theatre	6. Major Bowes
7. Town Hall Tonight (Fred Allen)	7. Bob Hope
8. Rudy Vallee	8. Fitch Bandwagon (Guest orchestras)
9. Burns and Allen	9. Kate Smith Hour
10. Hollywood Hotel	10. Pot o' Gold
1941	1943
1. Chase and Sanborn program	1. Fibber McGee and Molly
2. Jack Benny	2. Bob Hope
3. Fibber McGee and Molly	3. Chase and Sanborn program
4. Lux Radio Theatre	4. Jack Benny
5. Aldrich Family	5. Lux Radio Theatre
6. Bob Hope	6. Red Skelton
7. Maxwell House Coffee Time	7. Aldrich Family
8. Walter Winchell	8. Maxwell House Coffee Time
9. Kate Smith Hour	9. Mr. District Attorney
10. Fitch Bandwagon	10. Kay Kyser
11. Kraft Music Hall	
1944	1945
1. Bob Hope	1. Bob Hope
2. Fibber McGee and Molly	2. Fibber McGee and Molly
3. Jack Benny	3. Edgar Bergen, Charlie McCarthy, etc.
4. Walter Winchell	4. Lux Radio Theatre
5. Kraft Music Hall	5. Jack Benny
6. Seafest Village Store	6. Fred Allen
7. Chase and Sanborn program	7. Red Skelton
8. Lux Radio Theatre	8. Mr. District Attorney
9. Mr. District Attorney	9. Walter Winchell
10. Screen Guild Players	10. Eddie Cantor
11. Abbott and Costello	

The predominance of serial dramas in daytime schedules was evident in the lists of the most popular daytime programs. The following list shows the leaders in C.A.B. appraisals of daytime shows during the latter months of each year:

1937	1939	1941
1. Guy Lombardo	1. Ben Bernie	1. Life Can Be Beautiful
2. Today's Children	2. Ma Perkins	2. Kate Smith Speaks
3. Ma Perkins	3. Hobby Lobby	3. Woman in White
4. Vic and Sade	4. Pepper Young's Family	4. Right to Happiness
5. The O'Neills	5. Vic and Sade	5. Romance of Helen Trent
6. Pepper Young's Family	6. Guiding Light	6. Our Gal Sunday
7. David Harum	7. Mary Marlin	7. Guiding Light
8. Just Plain Bill	8. Woman in White	8. Ma Perkins
9. Magic Key of RCA	9. Stella Dallas	9. Road of Life
10. Big Sister	10. Goldbergs	10. Mary Marlin (Vic and Sade)
	11. Road of Life	
1943	1944	1945
1. Kate Smith Speaks	1. When a Girl Marries	1. Breakfast in Hollywood (11 A.M., E.S.T.)
2. Stella Dallas	2. Kate Smith Speaks	2. Portia Faces Life
3. Big Sister	3. Ma Perkins (CBS)	3. When a Girl Marries
4. Pepper Young's Family	4. Breakfast at Sardi's (Kellogg)	4. Big Sister
5. Right to Happiness	5. Our Gal Sunday	5. Pepper Young's Family
6. Backstage Wife	6. Romance of Helen Trent	6. Young Widder Brown
7. Ma Perkins (CBS)	7. Portia Faces Life	7. Ma Perkins (CBS)
8. Young Widder Brown	7. Breakfast at Sardi's (Procter and Gamble)	8. Breakfast in Hollywood (11:15 A.M., E.S.T.)
9. Romance of Helen Trent	8. Big Sister	9. Breakfast Club (9:30 A.M., E.S.T.)
10. Our Gal Sunday	9. Stella Dallas	10. Ma Perkins (ABC)
11. Lorenzo Jones	10. Pepper Young's Family	

U.S. Trends.—Year by year, notable developments in U.S. radio programming during the decade included the following:

In 1937 the audience-participation program, best typified by the "Major Bowes' Amateur Hour," emerged as a dominant type. The trend toward development of movie talent programs originating in Hollywood continued and was recognized early in the year as a major factor in network operations. Dramatic programs were increasing. Political parties used radio more than ever before to com-

mand larger audiences. "Educational radio" received greater emphasis both in quantity and quality of programs. Greater effort was spent to make the broadcasts entertaining as well as instructive. Among the leaders in this field during 1937 were George V. Denny's "Town Hall of the Air," a series of debates on problems of the day conducted by recognized authorities with the audiences invited to participate by submitting questions from the floor; and the Columbia Broadcasting system's "American School of the Air," which was required listening in many schools. To such outstanding programs as these were added many worth-while dramatizations sponsored by the U.S. office of education as the federal government entered the field of radio education.

In 1938 rehearsals for radio's later wartime role were provided in two major international crises: the German annexation of Austria in March, and the Czechoslovakian crisis six months later. Several new and improved radio techniques were used to accomplish rapid, comprehensive coverage of events.

The Mutual Broadcasting system broadcast recordings of official news reports received by short wave from European news centres. The Columbia Broadcasting system utilized its "European Roundup" to bring listeners concise, on-the-spot accounts direct from its own or newspaper correspondents overseas. A C.A.B. survey showed that on Sept. 28, 1938, the day before the Munich conference, one out of every six programs heard was a news broadcast. The most sensational program of the year was the "Mercury Theatre" broadcast on Oct. 30 when Orson Welles dramatized H. G. Wells' *War of the Worlds* and terrified thousands who accepted as fact his description of an invasion of New Jersey by warriors from Mars.

The speed of radio in bringing news into the homes of its listeners was demonstrated repeatedly during the tense months preceding and following the start of World War II in 1939. Americans learned that war had been declared even before the news reached the German people, hearing it from Britain's Prime Minister Neville Chamberlain in a speech received in the United States at 6 A.M. (New York time) on Sept. 3, while Berlin commentators, heard in broadcasts picked up by U.S. networks following the Chamberlain speech, were still talking of hopes for averting war with England. On that day as many as 78 newscasts were carried on one network alone.

With war an actuality, the always-present radio problems of time and distance were complicated by another major difficulty: that of sorting facts from propaganda. To help guard U.S. neutrality, the nation's major networks on Sept. 11 voluntarily agreed to move cautiously in handling European news, adopting the motto: "When in doubt, don't; there is always time to check."

The first on-the-scene war broadcasts from U.S. radio correspondents reached the American people in mid-Oct. 1939. On Oct. 9 the first contingent of U.S. war correspondents officially accredited by British military authorities left London for "somewhere in France." In the group were Bill Henry of Columbia Broadcasting system and Arthur Mann of Mutual Broadcasting system, two of the first radio reporters ever assigned to front-line duty.

Radio presented many outstanding special-events broadcasts during 1939, from the address of President Roosevelt at the opening of congress on Jan. 4 to a dramatic eyewitness account of the scuttling of the German battleship "Graf Spee" in late December. The year's schedule included a description of the funeral ceremonies of Pope Pius XI and the coronation of Pope Pius XII; the sinking of the submarine "Squalus"; an address by the Duke of

Windsor; the visit to America by Britain's king and queen; the president's address at the opening of a special session of congress and the opening of the world's fairs in New York and San Francisco.

The presidential election year of 1940 brought campaigners to the microphone in greater numbers than ever before, starting with the Republican National convention in June and the Democratic convention a month later. Wendell Willkie's Elwood, Ind. speech accepting the Republican presidential nomination won the highest listener rating (37.8%) ever accorded a political broadcast in a C.A.B. survey up to that time. But President Roosevelt held a consistent edge over his opponent in audience appeal, especially in the closing days of the campaign. His Oct. 30 speech from Boston was rated 38.7% by C.A.B.

War news continued to occupy a significant portion of the broadcast day throughout 1940. With Germany's unexpected drive into Scandinavia in April, radio moved into an "emergency" status to provide coverage of the new front. When Italy entered World War II on June 10, the concentration of speeches by national leaders surpassed anything since the outbreak of hostilities on Sept. 3, 1939. President Roosevelt's June 10 speech at Charlottesville, Va., in which he denounced the "stab in the back" by Italy, received a rating of 45.5%, the highest mark recorded by C.A.B. for a speech of any kind up to that time.

In the entertainment field, the trend was toward shorter and less formal programs. Expensive variety shows, usually built around "name talent," gave ground to less expensive programs of the quiz type. Thirty-three audience-participation programs appeared on the networks. Drama also moved ahead. Variety shows remained at the top in both time and popularity, but by a smaller margin. The Federal Communications commission (FCC) announced on March 29, 1940, its belief that five contest programs, of the cash "give-away" type, violated the section of the Communications act which prohibited lotteries. The justice department later ruled, however, that the cases were not prosecutable.

The Japanese bombing of Pearl Harbor on Dec. 7, 1941, and subsequent developments, demonstrated more fully than ever before that events, rather than the leading commercial programs, might be the yardstick of maximum audience size. The president's Dec. 8 appeal for declaration of war against Japan was rated by C.A.B. at 65.7%, and his address the following night broke all records for nighttime listening with a rating of 83%. Prime Minister Winston Churchill's voice also became familiar to U.S. listeners during 1941, attracting substantial audiences in broadcasts from Britain and, during a December visit, from the United States. His best C.A.B. rating was 44.7% for a noontime broadcast on Dec. 26.

The scope of radio's coverage of the war in Europe had been extended once again in 1941 by Germany's surprise declaration of war on the U.S.S.R. in June. Newscasters, like news listeners, were caught napping, but scurried to their microphones in various stages of dress from pajamas to evening clothes. From then onward, the progress of the soviet campaign was a part of virtually every news broadcast.

The restraint which characterized most British radio programming, and the matter-of-fact calmness of its news reporting, were demonstrated by the British Broadcasting Corp. (BBC) on the first day of 1941. During an attack by German planes, Broadcasting house in London was bombed and seven BBC employees were killed, but the announcer on the air at the time went ahead with his commentary without a break, never mentioning the direct

hit or deviating from the prepared script.

On the last day of 1941, the radio in Manila fell silent. To prevent their falling into the hands of the Japanese, all broadcast stations in the city were dismantled and destroyed by their owners. (The silence lasted until U.S. radio returned to the air in Manila in Feb. 1945, with the liberation of the city.)

During 1942 several trends appeared in radio programming, many of them resulting largely from wartime operation. War-effort programs were in the forefront, presented by the networks (more than half were sustaining), by government agencies and departments working through the Office of War Information's (OWI) new and elaborate radio branch, and by the advertisers. To mobilize the government's advertising campaign, the Advertising council (later the War Advertising council) was formed in February, and seven months later the army set up a top radio performers' "Committee of 25" to broadcast and tour military installations in behalf of radio. In October, OWI Director Elmer Davis estimated that radio was contributing \$64,000,000 worth of time to the war effort annually. At year's end it was estimated that the major networks devoted more than 4,000 network hours to war-effort programs and announcements during 1942.

Reflecting the first major change in listener preference in the radio-entertainment field since the rise in popularity of audience-participation programs, the comedy drama emerged as an audience favourite, filling 10% of all network evening time during the year. In the daytime schedule, considerable controversy developed about the so-called "soap operas," but unrelenting sponsor support resulted in their retention for the most part, although several series were discontinued. A reversal of the former movies-to-radio trend among entertainers also became apparent in 1942, as old-time radio stars began to show up in some of the leading screen plays. Abbott and Costello, radio stars before they went into motion pictures, were the top box office attraction of the movies in 1942. Other top-flight motion picture actors who starred in radio before they received Hollywood calls included Bob Hope, Bing Crosby and Jack Benny. The talent costs of network commercial programs were estimated by trade sources at approximately \$35,000,000 for nighttime programs and \$8,000,000 for daytime programs.

Throughout 1943 the emphasis on war programming continued, and many commercial programs made regular use of war effort and public service themes. The radio branch of the OWI, which cleared all programs in the war-effort category, estimated in March that radio had donated \$86,900,000 in time and talent—\$71,570,000 and \$15,330,000 respectively—to war-effort messages alone. A regular weekly schedule of campaigns was inaugurated and became evident in the number of special announcements and programs which appeared both on the networks and on individual stations throughout the country.

The year 1943 saw an increase in the number of international pickups employed by the networks, with more broadcasts direct from the theatres of war. All networks expanded their war news staffs. The wire recorder, a lightweight instrument using a magnetized wire for recording and reproduction, came into prominence in war reporting; dispatched to the fighting fronts through the war department's radio branch, it was used for many outstanding programs employing actual pickups from battle zones. In the unconditional surrender of Italy to the Allies in September, radio was given a new war role as General Eisen-

lower broadcast the announcement to the world.

From the standpoint of entertainment, 1943 was a year of new programs, with all types except classical and semi-classical music represented among the newcomers. Many entertainers from other fields, including such established comedians as Groucho Marx and Jimmy Durante, were given featured programs. "Grand Ole Opry," a variety show of the "hillbilly" type, was promoted from regional to coast-to-coast status. New offerings in melodrama included "Suspense," added as a sustaining program. Familiar and popular music were represented in a large number of new shows, and new dramatic productions ranged from such dramatized war stories as "The Man Behind the Gun" to another revival of "Sherlock Holmes."

The average daytime audience for network productions attained an all-time high during 1943, according to C. E. Hooper Inc., radio research organization. The volume of daytime serials remained constant at about 50 hours per week, but weekday non-serial programs surged upward from 6½ hours to 22¾ hours a week between January and December. Network talent costs continued to increase during the year, generally as a result of widespread introduction of union scales for performers and announcers. Trade estimates placed talent costs of network commercial programs at about \$40,000,000 for nighttime programs and \$8,000,000 for daytime programs.

In the following year (1944), radio's attainments in news coverage again kept pace with the armed forces' military achievements, notably in reporting the landings in France and in describing General MacArthur's return to the Philippines. In preparation for the invasion of Europe, the networks for the first time pooled their facilities, and during the early days of the operation virtually all broadcasts were for the use of all networks. One of the most spectacular, used on all networks and frequently rebroadcast, was one recorded by George Hicks, American Broadcasting Co. commentator, aboard a landing craft under attack by German planes as it moved toward the coast of France. Such major networks as the National Broadcasting Co. and the Columbia Broadcasting system dropped their bans on recorded broadcasts to carry similar running descriptions of invasion operations.

With the D-day landings on June 6, radio added a new phase to its war service. A radio transmitter was landed on the beachheads and used immediately to establish communication not only across the channel to Britain but direct to the United States. Regular radio units were set up with the armed forces, and the American Broadcasting system in Europe (ABSIE), using high power, was established to broadcast direct to the troops in occupied territory. In the Pacific, news of the October invasion of the Philippines by General MacArthur's troops was relayed throughout the world from a radio ship rigged for the purpose and maintained later as the radio operating base in that theatre.

The 1944 presidential election campaign, conducted primarily by radio, brought political oratory to the air in the greatest volume in history. It was estimated that each party spent about \$1,500,000 for radio time, exclusive of repayment of talent which was displaced. In audience appeal as in votes, President Roosevelt led his opponent, the C.A.B. average ratings being 24.4% for Roosevelt and 16.7% for Governor Thomas E. Dewey. In a nonpolitical, invasion eve speech on June 5, keyed to the fall of Rome, President Roosevelt attracted 96.9% of all sets in use, according to the C.A.B.

Radio's time and talent contributions to the war effort increased steadily. The National Association of Broadcasters estimated that the total reached \$161,752,000 in 1944, distributed as follows: Radio advertisers \$64,000,000; stations and networks \$78,000,000; talent \$20,000,000. This was an increase of 8% over 1943 totals. Although no accurate data were computed covering aggregate talent costs of network commercial programs, industry estimates indicated a continuation of the previous years' upward trend, putting the figures in the neighbourhood of \$45,000,000 for nighttime programs and about \$10,000,000 for daytime shows.

Military victory in 1945, first in Europe and later in the Pacific, brought a deluge of special-events broadcasts and lifted listening to the highest peaks since the United States had declared war against Japan. By coincidence the peak audiences on both victory days were identical—63.1% of all receiving sets in use, according to surveys by C. E. Hooper Inc. Twice during the year all normal network schedules were cancelled and special broadcasts were substituted: first, upon the death of President Roosevelt, the nation's "first radio president," on April 12; and again four months later, on Aug. 14, with the end of the war against Japan. The same was true to a lesser extent on V-E day, May 8, which networks followed with special programs on the victory theme at a time and talent expenditure of approximately \$1,000,000. One of the outstanding programs of the year was Norman Corwin's "On a Note of Triumph," broadcast on the Columbia Broadcasting system as part of the V-E day celebration.

On Sept. 1, 1945 (U.S. time), the official ceremonies of Japan's surrender were recorded aboard the U.S. battleship "Missouri" in Tokyo bay and broadcast on all networks, after being held up for 90 minutes by transmission difficulties. Other listening highlights of 1945 revolved around the inauguration of President Roosevelt for his fourth term and later the inauguration of President Truman; the first use of the atomic bomb and the U.S.S.R.'s entry into the war against Japan; the sessions of the United Nations Conference on International Organization in San Francisco, and, after the end of World War II, the lifting of many wartime controls and the first steps toward reconversion of the civilian economy.

The fall season of 1945 saw the greatest influx of new programs in radio history, reflecting the change to a peacetime advertising perspective, the development of new program ideas and the return of many old radio favourites from war service or war-related employment. New programs which achieved popularity included the "Danny Kaye Show," "Theatre Guild on the Air," "Request Performance," "This Is Your FBI" and "Textron Theatre." In the daytime ranks, Fred Waring and his orchestra found popularity as a sustaining program, and "Queen for a Day" and "Ladies Be Seated" were among the most popular new commercial programs. A survey conducted by *Broadcasting* found that most stations were devoting 15% to 20% of their broadcast time to news, compared with about 5% before the war, and that they expected to maintain the increased volume of news shows in peacetime. Talent costs of network commercial shows continued to rise in 1945 and were estimated at approximately \$50,000,000 for evening programs and \$10,000,000 for those carried in the daytime.

More local news, more local live-talent programs, and more emphasis on "public-interest" programs were among the major trends of 1946 as found in a survey conducted for *Broadcasting* by Audience Surveys Inc., an independent research organization. Results of the survey, published in

December, showed that 76% of the reporting stations spent an average of 24% more money on programming in 1946 than in 1945. Only 2% spent less. Another dominant trend was in the application of stricter controls over the length and content of commercial announcements, reflecting a natural reaction from wartime use of innumerable and often lengthy messages for government agencies and departments in support of the war effort.

A network program innovation of major stature in 1946 was the use of transcriptions, rather than live broadcasts, by one of the most popular entertainers in radio, Bing Crosby. The first major experiment in transcribed network programs, the opening broadcast of the series, on Oct. 2, won a listener rating of 23% from C. E. Hooper, Inc. A month later the rating skidded to 12.2%, but moved up to 15.8% in mid-November. If successful, the transcribed method was expected to be adopted by many other top-flight entertainers.

The whole question of whether or to what extent radio stations should be required to make appropriate identifying announcements when transcriptions or recordings were used on programs was made the subject of a hearing before the Federal Communications commission in late November. It was not linked with the Crosby series, however, having been initiated by the commission in June through a proposal to liberalize substantially its requirements for such announcements.

The Columbia Broadcasting system, the National Broadcasting Co. and larger stations generally opposed the liberalization plan, arguing that listeners would be deluded unless specifically told when transcriptions were used, and that recordings would gradually replace the far more costly live-talent shows. American Broadcasting Co., which carried the Crosby series, favoured the plan, as did many smaller stations and independent outlets which lacked the resources of large stations and relied heavily upon recordings and transcriptions to build up their audiences. The issue was decided in early December by a FCC ruling that stations must continue to tell listeners when recordings were used if the recordings were more than one minute in length, but waiving the requirement for recorded material up to one minute's duration.

Comedy and variety programs continued to hold a great share of radio time and radio audiences in 1946, with serial stories continuing to dominate the daytime popularity ratings. The C. E. Hooper report for mid-November showed Jack Benny in first place, Bob Hope in second and Edgar Bergen and Charlie McCarthy in third. The daytime list was led by "Right to Happiness," "When a Girl Marries" and "Aunt Jenny," all serial dramas.

A full schedule of special-events broadcasts was carried during 1946, including descriptions of the atom bomb tests in the Pacific, features as well as straight news and commentaries from the United Nations meetings, and detailed coverage of the off-year election landslide which returned the Republican party to control of house and senate. President Truman used radio frequently; C. E. Hooper, Inc. reported that he was heard by 25,217,000 persons in a May 24 speech on the railroad strike, and by 23,166,000 in an address on his veto of the first OPA bill in July. (For FM and television programming, see under *Growth and Developments*, page 702; see also Music.)

Commercial Broadcasting

The United States remained by all odds the world's foremost practitioner of free, commercial radio. Although no comparative data on their financial operations were available, it was known that the radio systems of all other

countries fell far short of the industry in the United States from the standpoints of both revenues and expenditures. Among U.S. networks and stations, total revenues from the sale of time increased approximately 163% during the decade; expenditures rose 135% and broadcast income (representing revenues less expenses, before payment of federal taxes) climbed 274%.

By way of comparison, Great Britain's British Broadcasting Corp. (BBC), which in point of programming perhaps was noncommercial radio's closest approach to radio in the United States, was reported to have received and spent approximately \$35,000,000 during the year ended March 1, 1945, while U.S. networks and stations reported revenues approaching \$300,000,000, expenses exceeding \$215,000,000 and a "net income" of more than \$83,500,000 during a comparable period.

U.S. Revenues, Expenses, Income.—Aggregate figures on U.S. time sales, revenues (after payment of agency commissions on time sales), total broadcast expenses aside from commissions, and the resultant broadcast income before income taxes were as follows for the period 1937-45, inclusive, based on compilations prepared by the FCC from annual reports filed by stations and networks:

Total time sales: \$1,717,843,408.
Total revenues: \$1,633,971,184.
Total broadcast expenses: \$1,205,823,294.
Total broadcast income: \$428,147,890.

Networks and their key stations—exclusive of the hundreds of affiliated and independent stations—increased their annual broadcast or "net" income per year from \$7,719,213 to \$18,046,722 during the ten-year period.

A year-by-year breakdown of revenues, expenses and broadcast income during the decade is provided in Table I, based on FCC reports. Commissions paid to agencies for the sale of time were deducted before figures on "revenues" were prepared, and, therefore, were not counted as "expenses." The figures on "broadcast income" were computed before payment of federal income taxes.

Table I.—U.S. Broadcast Revenues, Expenses, and Income
1937-45, inclusive
(000's omitted)

Year	Number of stations	Revenues	Expenses	Broadcast income
1937	629	\$114,010	\$91,656	\$22,354
1938	660	111,358	92,503	18,854
1939	705	123,881	100,043	23,837
1940	765	147,146	113,850	33,296
1941	817	168,779	123,940	44,839
1942	851	178,839	134,207	44,632
1943	841	215,317	148,842	66,475
1944	875	275,298	185,025	90,272
1945	901	299,338	215,753	83,584

Note: The number of stations listed for each year is the number which filed financial reports with FCC; a few stations in each instance failed to report. Figures for 1938 and 1939 include operations of three national networks; those for 1940 and 1941, three national and five regional networks; 1942 and 1943, four national and six regional networks; 1944 and 1945, four national and five regionals.

As shown by Table I, the upward trend of broadcast expenses was never interrupted between 1937 and 1945, while revenues increased consistently after a momentary lapse in 1938. In three years of the ten, however, the rate of increase in costs surpassed the increase in revenues, with a falling off resulting in broadcast income. The first occurred in 1938, a drop of about 15% below the 1937 level. The second, in 1942, was almost negligible, amounting to about 0.5%. The third, in 1945, was a 7.3% slump which FCC officials attributed partially to the number of new stations which at best had not reached "normal" operating incomes and which consequently encountered losses in some instances.

Average Broadcast Income.—A half-decade summary of

the growth of average station income was provided in a report issued by the FCC in late 1946. Data from the stations' past financial reports were broken down to show average income of stations in all power classes as well as the average for all stations, starting in 1941, as reflected in Table II.

Table II.—Average U.S. Broadcast Incomes, 1941-45, Inclusive
(000's omitted)

Class of Station	1941	1942	1943*	1944*	1945*
Clear channel:					
50-kw. full-time	\$370	\$331	\$400	\$496	\$458
50-kw. part-time	121	143	221	305	193
5-20-kw. full-time	28	38	61	129	101
5-20-kw. part-time	43	52	50	127	110
Regional:					
Full-time	\$54	\$52	\$79	\$114	\$106
Part-time	15	9	18	35	37
Local:					
Full-time	\$4	\$4	\$12	\$23	\$22
Day and part-time	4	3	7	10	10
All Stations†					
(Complete figures)	\$40,928	\$38,705	\$55,981	\$80,266	\$73,555

*Data for 1943, 1944 and 1945 do not include the operations of key stations of national networks, as reports filed by them with FCC do not include adequate segregations of expenses between station and network operations.

†This table covers the operations of 817 stations in 1941; 851 in 1942; 832 in 1943; 865 in 1944 and 891 in 1945.

Time Sales.—Time sales by networks and stations, the mark of radio's acceptance as an advertising medium as well as its chief support (representing 90% to 95% of all revenues), increased during every year of the decade, as shown in Table III, prepared from FCC records. Figures are before deduction of commissions paid to agencies, etc., which broadcasters considered an expense of sale.

Table III.—Total U.S. Time Sales, 1937-45 Inclusive
(000's omitted)

Year	Network Sales Retained By Networks	Revenues from Station Time Sales To Networks and Stations	To National and Regional Users	To Local Users	Totals
1937	\$35,812	\$22,141	\$23,117	\$36,838	\$117,908
1938	35,455	21,157	28,109	33,402	118,124
1939	38,809	24,114	30,472	37,315	130,711
1940	45,194	28,603	37,140	44,756	155,694
1941	49,554	32,092	45,681	51,697	179,027
1942	55,058*	30,130	51,059	53,898	190,147
1943	65,350*	39,294	59,352	64,104	228,102
1944	77,342†	52,027	73,312	84,960	287,642
1945	81,364†	52,609	76,696	99,814	310,484

*Includes operations of nine key stations of networks.

†Includes operations of ten key stations of networks.

Gross Billings.—Additional evidence of the advances made in over-all time sales during the decade was found in the figures on gross billings, which among broadcasters were a popular gauge of advertising volume. Gross billings differ from preceding reports on time sales in that they are computed on the basis of charges for a single broadcast, without deductions for frequency of use of a station's or network's facilities. *Broadcasting* magazine estimated annual gross billings during the decade as in Table IV.

Table IV.—Estimated U.S. Gross Billings, 1937-45 Inclusive
(000's omitted)

Year	National Network	Others	Totals
1937	\$68,828	\$75,314	\$144,142
1938	71,728	78,390	150,118
1939	83,114	88,000	171,114
1940	96,456	111,500	207,956
1941	106,900	130,700	237,600
1942	118,200	136,600	254,800
1943	151,791	155,400	307,191
1944	190,677	201,200	391,877
1945	199,580	220,800	411,547

Incidental Revenues.—Although time sales normally accounted for the bulk of the industry's revenues, the increase in funds received from other sources—from the sale of talent, booking commissions, etc.—more than kept pace

with the rapid rise of time sales, approximately quadrupling between 1937 and 1946. Incidental revenues in 1937 were reported at about \$8,000,000. By 1940 they had grown to \$13,181,948. In 1942 they reached \$15,196,554. The following year they totalled \$19,613,621; in 1944, \$28,959,072 and in 1945 \$32,777,553.

Losses.—While broadcast income increased during the decade, the number of "losing" stations dropped appreciably and average losses followed a similar downward trend with two exceptions.

In 1939 227 of 705 reporting stations experienced losses aggregating \$2,220,471, an average of \$9,783 per losing station, according to FCC records. The following year, 187 of the 765 operators reported a combined loss of \$1,551,812, an average of \$8,298. In 1941 losing stations numbered 174 out of 817 reporting; their combined loss was \$553,440, their average loss \$3,180. Two years later the number of "losers" dropped to 94 of 841 stations for a combined loss of \$502,000, but the average rose to \$5,348. In 1944 41 of 875 stations lost \$154,310, averaging \$3,764, and in 1945 a total of 50 out of 901 showed losses aggregating \$643,006, which pushed the 1945 average loss up to \$12,860.

Tangible Property.—With the year-to-year addition of new stations, and improvement and expansion of others, the original investment in stations and associated broadcasting equipment moved up from \$46,240,128 in 1937 to \$72,281,223 in 1945, according to FCC compilations, while depreciated costs rose from \$25,795,104 to \$34,546,328. These figures related only to stations—613 in 1937 and 891 in 1945.

In addition, in 1945 the original cost of the tangible broadcast property of 4 nationwide networks and their 10 key stations was reported as \$15,699,154, and that of 3 regional networks as \$121,563, for a total of \$88,101,940. Depreciated costs of the major networks and their keys during 1945 were listed as \$6,983,190; 3 regional networks, \$65,501, and industry total, \$41,595,019.

In other years of the decade, valuation of tangible property in use in the industry had a composition as shown in Table V, from FCC records.

Table V.—Tangible Property of the U.S. Broadcasting Industry
(000's omitted)

Owner	1940		1943		1944	
	Orig. Cost	Deprec. Cost	Orig. Cost	Deprec. Cost	Orig. Cost	Deprec. Cost
Stations*	\$57,811	\$31,978	\$67,151	\$35,415	\$68,466	\$34,050
Major networks	\$11,920	\$7,373	\$13,884	\$6,645	\$14,418	\$6,433
Regional networks	\$1,184	\$702	\$112	\$75	\$112	\$68
Totals in complete figures:						
Original cost	\$70,916,312		\$81,148,128		\$82,997,650	
Depreciated cost	\$40,055,112		\$42,136,777		\$40,552,273	

*Figures on stations represent 765 in 1940; 832 in 1943; 865 in 1944.

Growth and Developments

Both frequency modulation (FM) and television won recognition as practical operations (although television was not yet a profitable one) during the decade 1937-46, and both made sensational gains, particularly in the United States in the postwar years. But from the standpoint of numbers, on a world-wide basis, standard or amplitude modulation broadcasting (AM) outdistanced all other branches of the radio art in growth.

Standard Broadcasting.—Compilations by *Broadcasting* from information supplied by the U.S. department of commerce and other official sources, including in some cases reports from the nations themselves, showed approximately 2,300 broadcasting stations known to be on the air in



Above: Company of the Metropolitan Opera of New York during a presentation of *Aida*. Saturday afternoon broadcasts from the "Met" continued to be one of the outstanding musical offerings in radio between 1937 and 1946

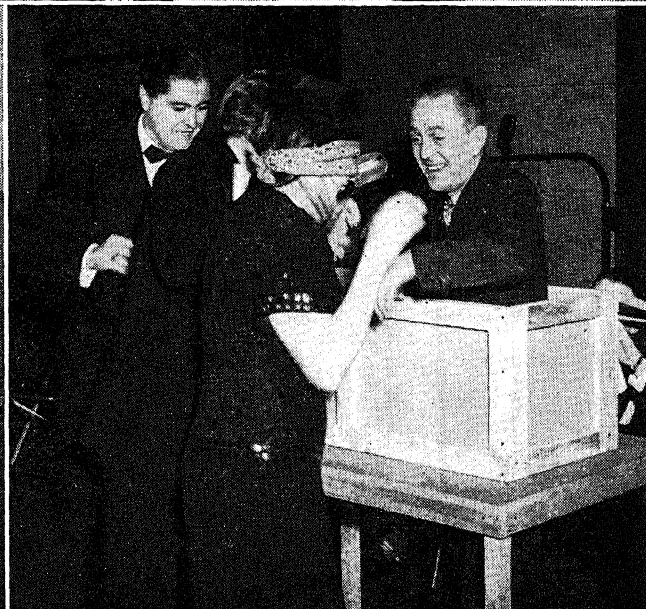
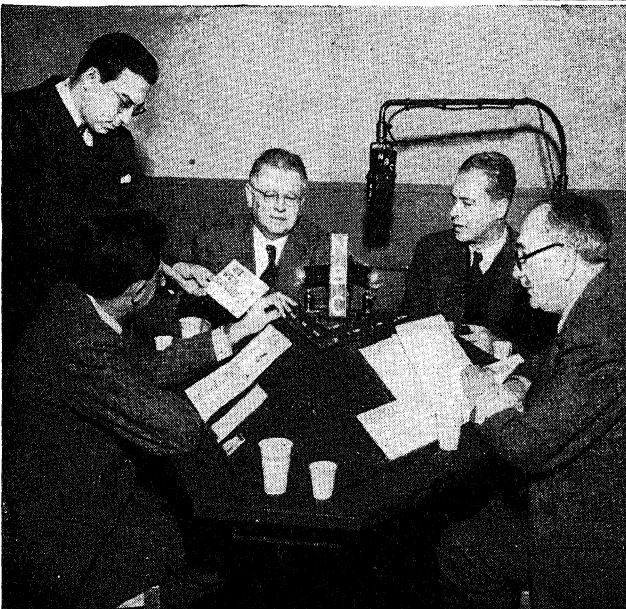
Upper right: "When a Girl Marries," a U.S. serial drama which had more listeners than any other daytime program during 1944 and 1945, according to Hooper ratings. Mary Jane Higby and Robert Haag of the cast are shown at the microphone

Right: Arturo Toscanini conducting the NBC symphony orchestra. Concert music filled 3.2% of evening radio time on the U.S. networks in 1946



Lower right: "Truth or Consequences," a popular U.S. audience-participation program

Below: Guests of the University of Chicago Round Table, Chicago, Ill., continued to offer timely debate on current affairs throughout the decade 1937-46



1937. These included long-wave, medium-wave and short-wave stations. For some nations the totals were known to be incomplete; in Spain, for instance, the civil war of 1936-39 made it impossible to obtain accurate figures, while in China the occupation by Japanese troops posed a similar barrier to complete reporting.

In 1946 the war-born Foreign Broadcast Intelligence service (FBIS) of the U.S. war department, formerly a branch of the FCC, published a list of approximately 3,365 long-wave, medium-wave and short-wave stations known to be in more or less regular operation throughout the world, excluding approximately 1,500 medium-wave stations in operation or authorized in the United States. With these, the total was 4,865.

Comparatively, these figures were useful in providing a general picture, rather than an exact comparison, of broadcasting stations in operation in 1937 and again in 1946. The latter total, for example, included relay stations, which for the most part were excluded from the 1937 compilation. It also included stations which were seasonally inactive, and those whose frequencies were found to vary over a long period of time, usually owing to transmitter instability or to attempts to escape chronic interference. Hundreds of the total number were stations set up by Allied forces in occupied countries to serve occupation troops and civilian populations, and many of these eventually would be discontinued. The total did not include stations which were off the air, a particularly frequent development among stations in battlefield countries.

Any error in the two compilations, however, apparently was on the conservative side. While the absence of uniform reports from all nations left the 1937 list incomplete, similar problems arose in 1946 (primarily in regard to the Manchurian situation), and at year's end, FBIS had a new list in preparation which spokesmen said would show even more stations than the number previously reported.

For purposes of general comparison only, the number of stations reported for geographical areas of the world during the two terminal years of the decade is shown in Table VI. To provide a somewhat better comparison, the figures for 1946 do not include those of any nation which either had no stations in 1937 or reported none. Thus the table shows the increase on an "identical nations" basis.

Again counting short-wave as well as medium-wave and long-wave stations, with 1946 figures including relays and stations operated by Allied nations in occupied countries, the breakdown according to nations included the following (the list shows leading or typical countries within continents and is therefore not a list of the leaders of the entire world from the standpoint of number of stations):

Country	1937	1946
United States	734	1,632
U.S.S.R.	77*	310
Mexico	102	249
Japan†	40	173
Australia	112	162
Canada	83‡	159
Brazil	55	128
Chile	64	119
Colombia	47	114
Cuba	76	103
Great Britain	33	90
Spain	..§	75
Argentina	45	72
France	26	61
Germany	40	46
Italy	24	39
Union of South Africa	11	30
Norway	19	21

*As of Dec. 1936; probably incomplete.

†Includes Japan, Korea and Formosa.

‡Does not include short-wave stations.

§Data not available owing to civil war.

Table VI.—Broadcasting Stations of the World 1937 and 1946, Operating or Authorized

	(Based on reports for the same nations in each year)		Countries included
	1937	1946*	
North America†	820	1,807	3
Central and South America	646	1,171	20
Europe‡	385	932	31
Asia§	135	428	12
Oceanic areas	157	236	7
Africa	39	97	11

*Includes relay stations.

†Figures are for U.S., Canada, Alaska; do not include Canadian short-wave stations in 1937.

‡Report incomplete for Spain, owing to civil war.

§Report incomplete for China, owing to military occupation and seizure of stations.

In the United States, the number of standard, or amplitude modulation, broadcasting stations grew from 721 at the end of 1937 to approximately 1,500 at the end of 1946, including those authorized and under construction as well as those in operation. The bulk of this increase came in the 14 months after the government's wartime restrictions on licensing and construction were lifted on Oct. 8, 1945. In late 1946 FCC officials estimated that they had licensed an average of one new AM station a day since V-J day.

The gain in the number of broadcasting stations in the U.S. was relatively steady from 1937 through 1942, the first full year of U.S. participation in World War II. Thereafter the advance was slowed by increasingly strict limitations on building. In 1942 for the first time in the ten-year period, the number of stations showed a decline. Another slight drop occurred in 1943. In both instances the lapses were attributed not alone to the construction bans but to the fact that a few stations, unable to cope with the military demand for skilled technical personnel, voluntarily ceased operations. For the most part, wartime licensing of new stations was permitted only in areas regarded as underserved from a military standpoint, with some further easings of restrictions in 1944.

The following list, from FCC records, traces the growth of AM broadcasting stations in the U.S. during the 1937-46 decade. Figures show the number on Dec. 31 of each year.

1937	721
1938	764
1939	814
1940	882
1941	923
1942	917
1943	912
1944	943
1945	1,004
1946*	1,500

*Estimated.

Listeners.—Radio receiving sets throughout the world increased from approximately 80,000,000 in 1937 to 125,000,000 at the end of the ten-year period. The United States consistently reported almost half of the world's total.

The leading 25 countries of the world in point of receivers in 1946 and the number of sets they reported in 1937 are shown in Table VII. The 1946 figures were released Jan. 1, 1947, by Caldwell-Clements, Inc., publishers, and *Tele-Tech* magazine, and unless otherwise indicated are for the year 1946. The 1937 figures were compiled by *Broadcasting* from information supplied by the U.S. department of commerce and other official sources.

In the United States, the decade's increase in receivers was from 37,600,000 to approximately 60,000,000. The FCC estimated unofficially that the number of sets in the nation in late 1946 approached 66,000,000. But even on the basis of the more conservative figure reported by Caldwell-Clements, Inc., the decade's gain amounted to more than 59%. Year by year, the increase is shown in Table VIII prepared for *Broadcasting* by O. H. Caldwell, of Caldwell-Clements, Inc.

The number of radio homes in the United States—those

Table VII.—Radio Sets in Use

Country	1937	1946
United States	37,600,000	60,000,000
Great Britain, Northern Ireland	8,347,800	10,673,000
Russia	3,938,000 (1939)	10,551,361*
France	4,018,992	5,376,000
Germany	8,285,193	5,500,000†
Japan	3,434,172	4,500,000‡
Sweden	1,041,737	1,858,614
Canada	Not reported	1,754,351
Italy	800,000	1,500,000
Australia	985,983	1,479,802 (1945)
Czechoslovakia	985,500	1,433,896
Argentina	1,000,000	1,300,000
Brazil	420,000	1,200,000
Denmark	689,389	1,009,802
Netherlands	1,009,973	1,000,000
Hungary	376,596	200,000§
Switzerland	500,000	867,365||
Austria	612,142	820,000
Belgium	976,343	700,000
Mexico	325,000	600,000
Finland	210,000	516,732 (1945)
China	No data available	500,000¶
Manchukuo	112,771 (1938)	500,000 (1944)
New Zealand	274,911	375,453 (1944)
Spain	500,000 (1938)	375,365

*Includes 6,110,000 loud-speakers connected to relay exchanges.

†14,000,000 in 1944; in all cases it is well to consider the effect of war on receiver totals in battlefield countries.

‡7,000,000 in 1943.

§904,176 in 1944.

||Includes 118,095 "wired wireless" connections.

¶Estimates vary between 350,000 and 2,000,000.

Table VIII.—Sets in Use in the United States
(1937-46, inclusive)

1937	37,600,000
1938	40,800,000
1939	45,300,000
1940	51,000,000
1941	56,000,000
1942	59,340,000
1943	57,000,000*
1944	55,000,000*
1945	56,000,000
1946	60,000,000

*The decline in 1943 and again in 1944 resulted from wartime bans which virtually halted production of radio receiving sets and replacement parts for civilian use.

with one or more receivers in operating condition or temporarily out of order because of missing tubes or other parts—rose from 26,666,500 in 1937 to 29,700,000 in 1941 and on up to 34,000,000 in 1945 and 35,000,000 in 1946.

Of the total sets in use in the nation, automobile radio receivers comprised 5,000,000 in 1937, 8,500,000 in 1941, approximately 8,750,000 in 1942 and 6,000,000 in 1945 and 1946.

The decline was attributed to the wartime cessation of production of both receivers and automobiles for civilian use.

Caldwell-Clements, Inc. broke down their 1946 world-wide figures on receiving sets as follows:

United States homes with radios	35,000,000
Secondary sets in these homes	15,000,000
Sets in business places, institutions, etc.	4,000,000
Automobile radios	6,000,000
Total sets in the United States	60,000,000
Total sets in the rest of the world	65,000,000
Total sets in the world	125,000,000

Frequency Modulation.—Frequency modulation (FM), the static-free form of broadcasting patented in 1933 by Edwin H. Armstrong, professor of electrical engineering at Columbia university, remained an experimental operation until Jan. 1, 1941. At that time, pursuant to an authorization adopted by the FCC in May 1940, operation of FM on a commercial basis was inaugurated. There were then 29 authorized commercial FM stations.

The total reached 62 early in 1942, but the infant art became a wartime casualty when military needs imposed a virtually complete ban on production of both station equipment and receiving sets, and on construction of buildings to house new stations. The number of authorized outlets dropped to 47 by early 1943, as many permittees gave up their grants for want of materials with which to go ahead. At the outset of 1944 authorizations totalled 50, and a year later they reached 62, including 10 noncom-

mercial educational stations operating in a frequency band set aside for that purpose.

Not until late 1945 and 1946 after wartime limitations were removed, did FM's development as a broadcasting medium begin to realize in fact the promise that was held out for it in its earlier years. By Oct. 1946, a year after the FCC resumed its normal licensing procedures, 540 FM stations were authorized outright or conditionally. Approximately 100 were on the air at the end of 1946, and scores of others were preparing to commence operations early in 1947. That no more were actually in operation was attributed to early postwar lags in production, brought on by strikes and shortages of vital equipment parts, which limited the output of both station equipment and FM receiving sets.

A great majority of the FM grants went to licensees of AM stations. An analysis of the 504 issued to Oct. 1946 showed 403, or 74.6%, were held by persons or companies already in the AM field.

A total of 204, or 37.8%, were in the hands of newspaper publishers.

In comparison to the 10 noncommercial educational FM stations authorized as of early 1945, 6 were on the air and 21 were under construction in late 1946, while 23 applications were pending before the FCC.

In several states the applications were more or less integrated into proposed state-wide plans for noncommercial educational stations.

While initial experiments in FM broadcasting included operations around 30 megacycles (mc.) as well as in the higher frequencies, the 1940 allocation for commercial operation assigned FM a band of frequencies in the 50-mc. region. In 1945 the band was reallocated to the portion of the spectrum between 88 and 108 mc., and despite the objections of some FM pioneers, including the inventor of the system, FCC authorities insisted that it would remain "upstairs" and told manufacturers they could proceed on that basis.

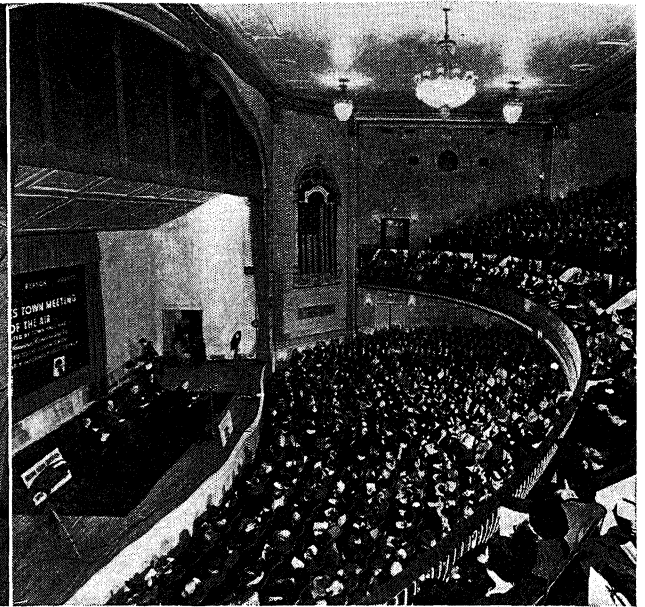
From its earliest days, FM advocates predicted the new form of broadcasting would permit a doubling or tripling of the number of engineeringly operable broadcasting stations. The FCC shared this view, anticipating that it eventually would replace AM stations altogether, with the possible exception of a few high-power AM outlets to provide service to wide stretches of underserved areas where operation of a number of stations, either AM or FM, would be economically impractical.

In line with this outlook for FM, the Columbia Broadcasting system, in the course of the 1946 clear-channel hearings conducted by the FCC, proposed a system of nationwide FM networks which it contended would provide better and more nearly complete service to the nation than would be possible through a rearrangement of AM stations.

Despite the progress in the FM station field, FM remained comparatively unheard even in the latter part of the decade 1937-46. In 1941 it was estimated that approximately 500,000 sets, representing a \$30,000,000 investment by listeners, were in use in the United States.

Production of FM receiver sets did not reach substantial quantity until the latter part of 1946; total output for that year was estimated to be slightly under 200,000.

Those who did have FM sets heard much the same type of programming which they were accustomed to hear on AM. FM stations owned by AM licensees engaged, for the most part, in duplication of their programs over both stations, within limitations imposed by the American Federa-



Upper left: Autograph hunters swamping Bob Hope with requests during an evening broadcast. Hope's program was rated the most popular on the U.S. networks in 1944 and 1945, according to C. E. Hooper Inc.

Upper right: "America's Town Meeting of the Air," during a 1946 discussion of the question: "Is Franco Spain a Threat to World Peace?"

Above: Walter Winchell, widely syndicated U.S. newspaper columnist, whose weekly broadcasts retained their popularity during the years 1937-46

Above: John Kieran, guests Deems Taylor and Clifton Webb, and F. P. Adams during a broadcast of "Information Please." With Clifton Fadiman (not shown) as master of ceremonies, Kieran and Adams formed the permanent team of "experts" whom readers tried to stump with questions

Lower left: Phil Baker putting a "\$64 question" to a participant in the quiz program "Take It or Leave It," a feature which became increasingly popular toward the end of the decade 1937-46

Lower right: Mark Warnow and his dance orchestra rehearsing a musical number for "The Hit Parade." Popular music accounted for a little more than 10% of U.S. evening network programs in 1946



tion of Musicians' (A.F.M.) ban on duplication of music played by A.F.M. musicians except upon payment of a "stand-by" fee. Independent FM stations generally followed AM programming lines with emphasis on music, which best displayed the clarity and high fidelity of FM.

The FCC's original rules for commercial FM operations required stations to broadcast at least two hours of unduplicated programs a day, but this requirement was waived in 1945 and the commission reiterated in 1946 that it did not intend to reinstate the rule in the immediate future.

Although United States broadcasters pioneered in FM, other countries throughout the world adopted it. In 1946 FM stations were in operation in Australia, South America, South Africa, Europe and Canada, and in Great Britain the British Broadcasting Corp. announced its intentions of establishing an FM network in the British Isles.

Facsimile.—This method of record transmission by radio, similar to wirephoto or radiophoto, remained in an "experimental" status throughout the decade. Great technical strides were made, however, and vast expansion was predicted for the postwar period. Some leaders in this field predicted home facsimile sets would be in operation in some 12 cities of the United States in 1947.

From prewar transmissions of about 4 sq.in. of copy per minute, facsimile operations progressed to 28 and later to 45 sq.in. per minute, with laboratory speeds up to 88 sq.in. reported in late 1946. The transmissions were in sufficient detail to handle all kinds of type and illustrations.

Pioneers in this new art, which was used with great success on the battlefields, considered it a natural adjunct of newspapers, not competition for them. It was generally agreed, however, that more experimentation was needed to determine the exact types of service the public would find most desirable. Leaders generally felt that the initial service, from the standpoint of transmissions for home receivers, probably would include radio program logs, retail advertising, news bulletins, stock reports, quotations, scores of athletic events, pictures and similar material which would extend the continuity of service between newspaper editions.

Facsimile functions on a narrow band (two kilocycles) and can be multiplexed on FM channels without disturbing the FM transmission. Broadcasts of this type can be received at any point where sound programs from the same station can be heard.

Stratovision.—A major innovation was the plan announced in 1945 by Westinghouse Electric and Manufacturing Corp., by which airborne transmitters would relay television, FM and other broadcast services by interlacing transmission from plane to plane, flying anchored courses at 30,000 feet.

The system was devised by Charles E. Nobles, 27-year-old radar expert employed by Westinghouse, whose engineers estimated that Stratovision could provide coverage of a 211-mi. area with one-fiftieth of the amount of power required by a 50-kilowatt transmitter on the ground to cover a 100-mi. radius. Its developers also considered it an ideal medium for bringing high-definition television (both black-and-white and colour) into reality. Tests were conducted throughout 1946 by Westinghouse in co-operation with Glenn L. Martin Co., co-developers of the system.

Subscription Radio.—Another innovation of the decade was subscription radio, a plan for a nonadvertising FM broadcast service in which the subscriber would pay a regu-

lar rental fee for program service. Founded and headed by William Benton, then chairman of Muzak corporation, vice-president of the University of Chicago and chairman of Encyclopædia Britannica, Inc., subscription radio proposed to offer subscribers an FM service over three channels. One channel would provide serious music, one popular music and one diversified program fare. It was popularly called "pig squeal" because only subscribers would have a special patented attachment to permit tuning to the three subscription radio channels; nonsubscribers would hear a high-frequency heterodyne described as a "pig squeal."

Details of the plan were presented at the FCC spectrum allocations hearings in 1944, with established broadcasters and manufacturers opposing it on the ground that it was antiadvertising and anticommercial radio. Benton announced suspension of the project in Sept. 1945, coincident with his assumption of office as assistant secretary of state, explaining that his government position conflicted with the private venture.

Manufacturing and Selling

The output of radio receiving sets by United States manufacturers experienced a gain of approximately 85.5% between 1937 and 1946 despite labour strife, parts shortages and other drawbacks which slowed production lines during much of the latter year. As 1946 ended, the Radio Manufacturers' association (R.M.A.), composed of most of the major manufacturing companies, estimated the year's volume at 15,000,000 sets as compared with 8,083,144 in 1937.

Sales lagged slightly behind production throughout the prewar years. After U.S. entry into World War II, however, when there was no production for civilian use, the demand for new and replacement sets mounted to such a peak that a quick market was assured for virtually every receiver turned out in late 1945 and all of 1946.

Table IX shows progress made in production, retail sales, and retail value of sets sold from 1937 through 1946. Production figures were supplied by R.M.A. and represented the output of its member companies. The columns on retail sales and sales values from 1937 through 1945 were taken from a compilation prepared for the 1946 *Broadcasting Yearbook* by O. H. Caldwell, editor of *Television and Retailing*.

Table IX.—U.S. Civilian Set Production and Sales*
1937-46, inclusive

Year	Sets Produced	Retail Sales	Retail Value
1937	8,083,144	8,064,780	\$450,000,000
1938	7,141,811	6,000,000	\$210,000,000
1939	10,762,631	10,500,000	\$354,000,000
1940	11,831,187	11,800,000	\$450,000,000
1941	13,642,334	13,000,000	\$460,000,000
1942	4,306,983†	4,400,000	\$154,000,000
1943 . . . . .	.....	700,000‡	\$24,000,000
1944 . . . . .	.....	.....	.....
1945 . . . . .	.....§	500,000	\$20,000,000
1946|| . . . . .	15,000,000	15,000,000	\$750,000,000

*Value of tubes in receivers is included in figures on retail cost.

†Civilian production was terminated April 22, 1942.

‡Sales include 350,000 new and 350,000 used receivers.

§Reconversion to civilian production was undertaken at full scale after V-J day, but shortages of vital materials and other difficulties limited the year's output to approximately 300,000 new receivers.

|| Figures for 1946 are estimates.

Tube Production and Sales.—With the same temporary lags that were evident in set production, first during the general business recession of 1938 and later when military needs commanded virtually the entire energy of the radio manufacturing industry, radio tube production ranged upward from 92,055,700 tubes in 1937 to 159,120,562 during the first 10 months of 1946, according to R.M.A. reports.

In normal times, replacement tubes had represented from 25% to 40% of total tube production, but difficulty in securing replacements during World War II created an abnormal demand for them when they returned to the market in 1945 and 1946. In Dec. 1946, however, R.M.A. reported that tubes would be available in ample supply in the first quarter of 1947.

Year-by-year trends in production, sales and retail sales values of tubes are shown in Table X, comparable to the preceding table on sets and based on the same sources of information:

Table X.—U.S. Civilian Tube Production and Sales
1937-46, inclusive

Year	Tubes Produced	Retail Sales	Retail Value
1937	92,055,700	91,000,000	\$85,000,000
1938	74,690,527	75,000,000	\$93,000,000
1939	98,499,926	91,000,000	\$114,000,000
1940	106,850,747	115,000,000	\$115,000,000
1941	108,451,993	130,000,000	\$143,000,000
1942	114,238,098	87,700,000	\$94,000,000
1943	.....	17,000,000	\$19,000,000
1944	.....	22,000,000	\$25,000,000
1945	.....	30,000,000	\$35,000,000
1946	159,120,562*	159,120,562†	\$186,150,000†

*Production, January-October.

†Estimated, January-October, on basis of strong demand for replacement tubes and also for new sets, whose tubes were counted in total production.

Automobile Radios.—The manufacture of receivers for automobile use made substantially less gain during the decade than did the output of other sets and tubes. Even in its best year in history, 1941, this phase of the industry recorded less than a 15% increase in units over its previous high mark, reached in 1937. Primarily because the public demand was centred on new console and table-model receivers for home and office use, manufacturers as a whole devoted only slight attention to automobile sets after World War II ended.

Statistics prepared and copyrighted by Caldwell-Clements, Inc., publishers, showed 1,750,000 automobile radios produced in 1937 and put their retail value at \$87,500,000. The following year, production dropped to 800,000 sets with a retail value of \$32,000,000. In 1939 it rose to 1,200,000 (retail value \$48,000,000), and in 1940 to 1,700,000 (\$60,000,000). The total reached 2,000,000 in 1941, but lower prices then in effect left their retail value some \$17,500,000 less than the value of the 1,750,000 sets of 1937. In 1942 production dropped to 350,000 receivers valued at \$12,250,000, while the 1946 total, after 3 years of nonproduction, was reported at 150,000 sets worth \$9,000,000 at retail.

Wartime Production.—The manufacturing industry reached an all-time peak in volume of production during World War II, almost all of it in the war category. Within months after the War Production board froze the manufacture of all types of radio receivers on April 27, 1942, the industry was turning out \$30,000,000 worth of military products monthly. The next year the average reached \$250,000,000 monthly. It kept that pace, or exceeded it, throughout World War II. In both 1944 and 1945 the industry's total output was estimated at \$5,000,000,000 or more annually, and in 1944 radio-radar production alone accounted for approximately \$3,000,000,000 of the year's total.

In 1943 when the radio manufacturing industry hit its wartime stride, its total investment was estimated at \$350,000,000, its employees numbered 400,000, its annual pay roll was \$900,000,000 and its annual gross revenue was reported as \$3,500,000,000. Investment remained static from 1943 through 1945, but gross revenues, employment and pay roll reached their peaks in 1944: \$4,750,000,000

revenues, 530,000 employees and a \$1,200,000,000 pay roll. With cutbacks following the end of World War II, 1945 gross revenue totalled about \$3,000,000,000, approximately 350,000 employees were retained and payroll was \$750,000,000. These figures cover approximately 1,200 manufacturers of all types of radio-electronic goods.

By way of comparison, the 1946 figures for 1,100 radio manufacturers were reported by Caldwell-Clements, Inc. and its *Tele-Tech* magazine as follows: Total investment \$60,000,000; annual gross revenue \$350,000,000; employees, 80,000; annual pay roll, \$90,000,000.

Throughout World War II, radio distributors, dealers and similar establishments represented a total investment of approximately \$280,000,000 and reported annual gross revenues of around \$200,000,000. Their employees numbered about 100,000 and their annual pay roll was \$150,000,000. When sets became available once more, rapid expansion was evident in this field. In 1946 according to the Caldwell-Clements' reports, their total investment reached \$300,000,000; gross revenues climbed to \$700,000,000; employees totalled 125,000 and the annual pay roll was \$200,000,000.

Regulations

Regulation by government in virtually all parts of the world moved toward a closer check on broadcasting activities, although in the United States radio still remained a privately owned, free enterprise without competition from the government. In many countries, during the decade 1937-46, two systems of broadcasting arose—one owned and operated by the government, the other by private enterprise.

General regulations on a world-wide basis were drafted by the various world and regional broadcasting and telecommunications conferences (see *World Conferences*, page 713). Each country, however, promulgated its own regulatory measures.

As the decade closed, various Latin American nations had organized to fight government encroachment into free radio. They called upon the broadcasters of the United States to lend moral and financial support in their announced intention of keeping radio on a free, competitive basis. As a result of their concerted efforts, broadcasters of North, South and Central America met in Mexico City in late Sept. 1946 and organized the Inter-American Broadcasting association. At the close of the year, the National Association of Broadcasters of the United States had not formally determined to participate as a member, although sentiment favoured it.

In England the British Broadcasting corporation's charter was renewed until 1951, which meant the end of any hopes that Britain might permit commercial broadcasting patterned after the United States. France, which enjoyed both a government and private system of broadcasting prior to World War II, was operating only its government radio.

In Canada, where the government-owned Canadian Broadcasting corporation continued to compete with the private Canadian Association of Broadcasters, heated debates featured sessions of parliament in 1946, as the government proposed to take three clear channels from privately owned radio stations for government-operated stations.

Federal regulation of radio in the United States resulted in several supreme court decisions, some of which interpreted the Communications act of 1934 as giving the FCC broad powers over the broadcasting industry. Among the major court decisions and government regulations of the

decade ending with 1946 the following were, perhaps, the most significant: (1) The power of radio stations in the United States was limited to 50,000 watts; (2) Antimonopoly regulations affecting the networks were upheld by the supreme court; (3) ownership of more than one station serving the same area was forbidden; (4) the FCC proposed to prohibit newspapers from owning radio stations but after more than two years of investigation dropped the proceedings and announced that each application would be decided on its merits; (5) licences of radio stations in the U.S. were extended step by step from six months to the maximum three-year limit allowed by law; (6) commercial operation of frequency modulation (FM) and television was authorized by the FCC; (7) a reallocation of frequencies resulted in moving FM from 42,000–50,000 kc. to 88,000–108,000 kc.; (8) the FCC issued a warning in a report called the "Blue Book" to radio stations that it was displeased with "excessive commercialism"; (9) the supreme court ruled that the FCC could not consider financial injury to a rival established station in granting new applications if frequencies were available; at the same time the court held that the FCC had no control over business practices of radio stations.

The foregoing might be termed the major regulatory developments of the decade in the U.S., but many others marked the ten-year period. These dealt with political broadcasts, identification of commercial sponsors, the rights of atheists to time on the air and the requirement by the FCC of detailed financial and employment data from radio stations.

Chain Broadcasting Regulations.—Perhaps the most important and far-reaching regulations of the decade were those known as the Chain Broadcasting Regulations or "network monopoly rules." They affected the majority of radio stations in the United States. While the FCC had no jurisdiction over the networks, except as licensees of radio stations owned by the chains, the regulations actually controlled network contracts inasmuch as licensees dealing with networks were controlled.

Hearings on the proposed network regulations began before a subcommittee of the FCC on Nov. 14, 1938, and terminated on May 19, 1939. The FCC proposed to license networks as well as broadcasting stations, do away with exclusive network contracts and reduce the length of network contracts with affiliate stations from five years to one year.

For two years after the hearings closed, there was considerable talk in the radio industry about the proposed network regulations, but the commission took no action until May 2, 1941, when—at a secret meeting—a group of eight stringent regulations was adopted. In substance these proposed rules provided that: (1) No licence would be granted to a radio station which had an exclusive contract with any network; (2) no licence would be granted to any station which had a contract which prevented other stations in the same area or other areas from carrying network programs not broadcast by the first station; (3) network affiliate contracts were limited to one year; (4) networks could not hold optional time on an affiliate station; (5) stations were free to reject any network program, regardless of agreements with the network; (6) no licence would be granted to a network-owned station in an area where the network already had a station, and no licence would be granted to a network in an area where competition was not possible; (7) no licence would be granted to a station having a contract with a network which operated more than one network; (8) no networks could fix rates of station affiliates.

On the following June 2 the senate Interstate Commerce committee, under Chairman Burton K. Wheeler, Democrat of Montana, began an investigation of the proposed regulations. An interested member of the committee, who attended most of the sessions, was the senator from Missouri, Harry S. Truman.

Following the senate inquiry the FCC on July 21, 1941, postponed the effective date of the network regulations to Sept. 16, then on Aug. 28 the FCC announced an indefinite postponement. On Oct. 11, 1941, the commission announced amendments to the regulations, to become effective on Nov. 15. CBS and NBC filed suit in the federal district court, southern district of New York, to restrain the FCC from enforcing the network regulations.

The supreme court, however, on May 10, 1943, handed down an opinion sustaining the regulations and holding that the congress gave the commission "broad powers" over radio broadcasting. It was that decision, which was split 5–2, that led to demands on the part of the radio industry for new radio legislation. The supreme court held, in the opinion written by Justice Felix Frankfurter, in part:

"The Act itself establishes that the Commission's powers are not limited to the engineering and technical aspects of regulations of radio communication. Yet we are asked to regard the Commission as a kind of a traffic officer, policing the wave lengths to prevent stations from interfering with each other. But the Act does not restrict the Commission merely to supervision of the traffic. It puts upon the Commission the burden of determining the composition of that traffic. The facilities of radio are not large enough to accommodate all who wish to use them. Methods must be devised for choosing from among the many who apply. And since Congress itself could not do this, it committed the task to the Commission."

Following the supreme court decision the network regulations became effective on June 14, 1943. They were as follows:

Exclusive affiliation of station.—No licence shall be granted to a standard broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization under which the station is prevented or hindered from, or penalized for, broadcasting the programs of any other network organization.

Territorial exclusivity.—No licence shall be granted to a standard broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which prevents or hinders another station serving substantially the same area from broadcasting the network's programs not taken by the former station, or which prevents or hinders another station serving substantially a different area from broadcasting any program of the network organization. This regulation shall not be construed to prohibit any contract, arrangement, or understanding between a station and a network organization pursuant to which the station is granted the first call in its primary service area upon the programs of the network organization.

Term of affiliation.—No licence shall be granted to a standard broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which provides, by original term, provisions for renewal, or otherwise for the affiliation of the station with the network organization for a period longer than two years: *Provided*, that a contract, arrangement, or understanding for a period up to two years, may be entered into within six months prior to the commencement of such period.

Option time.—No licence shall be granted to a standard broadcast station which options for network programs any time subject to call on less than 56 days' notice, or more time than a total of 3 hours within each of 4 segments of the broadcast day, as herein described. The broadcast day is divided into 4 segments, as follows: 8:00 A.M. to 1:00 P.M.; 1:00 P.M. to 6:00 P.M.; 6:00 P.M. to 11:00 P.M.; 11:00 P.M. to 8:00 A.M. Such options may not be exclusive as against other net-

work organizations and may not prevent or hinder the station from optioning or selling any or all of the time covered by the option, or other time, to other network organizations.

Right to reject programs.—No licence shall be granted to a standard broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which (a), with respect to programs offered pursuant to an affiliation contract, prevents or hinders the station from rejecting or refusing network programs which the station reasonably believes to be unsatisfactory or unsuitable; or which (b), with respect to network programs so offered or already contracted for, prevents the station from rejecting or refusing any program which, in its opinion, is contrary to the public interest, or from substituting a program of outstanding local or national importance.

Network ownership of stations.—No licence shall be granted to a network organization or to any person directly or indirectly controlled by or under common control with a network organization, for more than one standard broadcast station where one of the stations covers substantially the service area of the other station, or for any standard broadcast station in any locality where the existing standard broadcast stations are so few or of such unequal desirability (in terms of coverage, power, frequency, or other related matters) that competition would be substantially restrained by such licensing.

Dual network operation.—No licence shall be issued to a standard broadcast station affiliated with a network organization which maintains more than one network: *Provided*, that this regulation shall not be applicable if such networks are not operated simultaneously, or if there is no substantial overlap in the territory served by the group of stations comprising each such network.

Control by networks of station rates.—No licence shall be granted to a standard broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization under which the station is prevented or hindered from, or penalized for, fixing or altering its rates for the sale of broadcast time for other than the network's programs.

New Rules.—Throughout the decade, the Federal Communications commission adopted new rules and regulations at intervals, but perhaps none were so far-reaching as those placed into effect on Aug. 1, 1939, governing standard broadcasting. These regulatory measures, the first major ones of the ten-year period, among other things limited the power of radio stations in the United States to 50,000 watts, although stations of greater power were operating in Mexico. WLW, Cincinnati, O., one of the pioneer broadcasting stations of the nation, had been operating from May 1, 1934, until March 1, 1939, with 500,000 watts by special authorization of the commission.

The senate on June 6, 1938, adopted a resolution introduced by Sen. Burton K. Wheeler to the effect that it was the "sense of congress" that powers in excess of 50 kw. would not serve the public interest. Senator Wheeler expressed fears that a "dozen superpowered stations placed strategically throughout the nation would create a monopoly and force the little fellow out of business."

But among the high points of the 1939 regulations was the designation of 26 channels as class I-A clear channels, on which 50-kw. stations would operate without nighttime interference. Broadcasting stations operating on the clear channels with high power are heard at great distances through sky wave signals. That is, the signals at night are reflected back to earth over a wide area from the ionosphere. Duplicate daytime operation on the same channel is possible if the stations are separated by sufficient distance. In the U.S. the distance was determined as approximately 750 mi.

In addition to the 26 class I-A channels, the commission also set aside an additional 18 channels for class I-B operation. That is with some duplication at night but requiring the secondary stations to protect the dominant sta-

tion by using directive antennas and lower power.

To encourage broadcasters to make full use of their facilities, the commission announced it would grant station power increases where such increases were needed and feasible. In allocating the 26 class I-A channels and 18 class I-B channels, the FCC said it wanted to ensure as much rural coverage as possible. Less than six years later, however, the FCC reopened the clear-channel question by announcing, on Feb. 21, 1945, that public hearings would be held to determine what changes, if any, should be made in policies affecting clear-channel stations. The commission said a re-examination of the clear-channel question "is necessary since the Commission studies reveal there are still large areas within the United States which receive no radio service at all during the daytime hours and no primary service at night." Hearings, called for May 9, 1945, but subsequently postponed several times until Jan. 14, 1946, were designated for the purpose of determining:

1. What recommendation concerning the matters covered by this order the Commission should make to the Dept. of State for changes in provisions of the North American Regional Broadcasting Agreement.
2. Whether the number of clear channels should be increased or decreased and what frequencies in the standard broadcast band should be designated as I-A channels and as I-B channels.
3. What minimum power and what maximum power should be required or authorized for operation on clear channels.
4. Whether and to what extent the authorization of power for clear channel stations in excess of 50,000 watts would unfavourably affect the economic ability of other stations to operate in the public interest.
5. Whether the existing geographical distribution of clear channel stations and the areas they served represented an optimum distribution of radio service among the several states and communities specified in Sec. 308(b) of the Communications Act required a geographical redistribution.
6. Whether it was economically feasible to relocate clear channel stations so as to serve those areas which did not receive service.
7. What new rules or regulations, if any, should be promulgated to govern the power or hours of operation of class II stations operating on clear channels.
8. What changes the Commission should order with respect to geographical location, frequency, authorized power or hours of operation of any licensed clear channel station.
9. Whether and to what extent the clear channel stations rendered a program service particularly suited to the needs of listeners in rural areas.
10. The extent to which the service areas of clear channel stations overlapped and the extent to which this involved a duplication of program service.
11. What recommendation, if any, the Commission should make to the Congress for the enactment of additional legislation on the matters covered by this order.

Although the FCC set out to determine what recommendations should be made to the state department with reference to the North American Regional Broadcasting agreement, the Second North American Regional Broadcasting conference was held, and an interim agreement was adopted on Feb. 25, 1946, before the clear-channel hearings had barely gotten under way (see *World Conferences*, page 713).

Hearings were held sporadically throughout 1946 on the clear-channel question. American radio industry was clearly divided into two schools of thought. Proponents of clear-channel stations urged that the commission permit powers in excess of 50 kw. and restrict the number of secondary stations on clear channels. This view was represented by the Clear Channel Broadcasting service (C.C.B.S.), an organization composed of clear-channel broadcasters. Only through increased power and exclusive use of the clear channels could the remote rural areas be reached, the C.C.B.S. argued.

On the other hand, broadcasters owning smaller stations and represented by the Regional Broadcasting com-

mittee, told the FCC that rural coverage could be assured only if clear channels were broken down to permit more than one station to operate on each channel.

In the meantime, the commission began granting construction permits for daytime stations on class I-A channels and adding more stations to the class I-B channels. A group of clear-channel broadcasters petitioned the FCC to stop granting daytime stations on clear channels until after the hearings were ended and the issue resolved. They contended that should the commission eventually permit power in excess of 50,000 watts, a serious interference problem would arise. That petition was denied.

Clear-channel broadcasters used Mexico as an example of competition from outside the U.S. Several broadcasting stations in Mexico had been using 100,000 watts power for some years. In 1945 Emilio Azcarraga, Mexico's foremost broadcaster and operator of XEW in Mexico City, announced plans to build a station using 1,000,000 watts power.

Multiple Ownership.—Following several months of investigation, the FCC on Aug. 5, 1941, announced adoption of a proposed order banning multiple ownership of standard broadcast stations. Under its proposal, the FCC would require some 40 licensees to dispose of 1 or more stations serving areas similar to other stations owned by the same licensee. Oral argument was held on Oct. 6 that year, but no further announcement was made until Nov. 23, 1943, when the commission, in a public notice, announced it had adopted a new regulation, banning multiple ownership. The regulation, which became effective June 1, 1944, follows:

No licence shall be granted for a standard broadcast station, directly or indirectly owned, operated or controlled by any person where such station renders or will render primary service to a substantial portion of the primary service area of another standard broadcast station, directly or indirectly owned, operated or controlled by such person, except upon a showing that public interest, convenience and necessity would be served through such multiple ownership situation.

Newspaper Ownership.—By a vote of 3-2, the Federal Communications commission on March 19, 1941, adopted an order calling for an investigation into ownership of radio stations by newspapers. "Hearings will be conducted to determine whether or not joint control of newspapers and radio broadcasting stations tends to result in an impairment of radio service under the standard of 'public interest, convenience and necessity,'" said the FCC public notice announcing the inquiry.

A supplemental order was issued in July 1941 broadening the scope of the investigation. Among the new issues was this: "To determine whether joint operation of newspapers and broadcast stations tends or may tend to prejudice the free and fair presentation of public issues and information over the air, or to cause editorial bias or distortion, or to inject editorial policy or attitude into the public service rendered by broadcast stations as a medium of public communications."

Just prior to the first order of March 16, the U.S. court of appeals for the District of Columbia, in an appeal of the *El Paso Times* (Tex.), which sought a radio station, held: "We know of no provision of statute or rule of law and are cited to none, which forbids broadcasting by the ownership of a newspaper."

Hearings began in mid-July 1943, and continued for more than six months. The American Society of Newspaper Editors bitterly opposed the commission, contending that under the Communications act the FCC had no authority to inquire into newspaper ownership of radio stations. In Jan. 1942 the U.S. court of appeals for the

District of Columbia, holding that the FCC was empowered to issue subpoenas for any investigation it deemed necessary "in the public interest," declared that there was nothing in the Communications act to discriminate against newspaper ownership of broadcasting stations.

Meanwhile, the commission ordered placed in the pending files all applications of newspapers for radio stations. A short time after that order, however, the wartime construction freezes were issued, and radio construction generally was at a standstill.

Finally, on Jan. 13, 1944, the FCC dismissed the newspaper-ownership proceedings and announced that all applications for broadcast licences would be determined on the individual merits of each. However the commission left itself some leeway in connection with applications of newspapers, when it said:

"In the processing of individual applications for licenses, the Commission will inquire into and in its decision give expression to 'public interest' considerations. The Commission does not feel that it should deny a license merely because the applicant is engaged or interested in a, particular type of business. However, it does not intend in granting licenses in the public interest to permit concentration of control in the hands of the few to the exclusion of the many who may be equally well qualified to render such public service as is required of a licensee."

In decisions following the newspaper-ownership dismissal, the commission denied some newspapers applications when competitive applicants not in the publishing field were bidding for comparable facilities. This was true in communities with one newspaper and no radio stations. On the other hand, the FCC granted new stations to some newspapers, while denying applications of others.

Other Regulations.—Many other regulatory measures were placed into effect by the FCC during the ten-year period, as follows:

The commission on Oct. 18, 1937, set aside channels in the ultra-high frequency band above 30,000 kc. for television.

Redefining its rules governing candidates for political office and their use of time on radio stations, the commission said a "legally qualified candidate means any person who has publicly announced that he is a candidate" for nomination or public office. That was on Nov. 26, 1941. Three years later, on Dec. 13, 1944, the FCC adopted new rules governing political broadcasts, which required radio stations to state properly the "true source of payment" for political broadcasts. This rule followed an investigation by the senate campaign expenditures committee which charged that certain political candidates paid for broadcast time of speakers, although radio stations made no mention that the programs were paid for.

Licences of radio stations in the U.S. were extended on Dec. 15, 1943, from two to three years, the maximum under the Communications act.

On July 25, 1944, the FCC asked congress for authority to pass on the prices of radio stations which were being sold. The commission listed sale prices of several, ranging from \$500,000 paid for WINX, in Washington, D.C., a 250-watt local station, by Eugene Meyer, Jr. & Co. Meyer was publisher of the *Washington Post*. The \$987,000 for the 10,000-watt WQXR in New York, paid by the *New York Times*, also was set out by the FCC as an example of high prices.

Subsequently the commission on July 18, 1946, adopted a rule requiring that when stations were placed on sale

the owners must advertise for 60 days in local newspapers to permit competitive bidders. The commission then would determine which of the bidders should buy the station. Several announced sales were withdrawn after the FCC invoked its rule.

In Aug. 1946 the backlog of applications was so great at the FCC that four "processing lines" were set up to handle them in the order of their respective filings. A total of 859 pending applications were being disposed of in the mass production system as the year closed.

Reallocation of Frequencies.—To the new static-free service, frequency modulation (FM) and to television, the reallocation of frequencies from 25,000 to 30,000,000 kc. opened the way for wide development. FM had been operating in the band from 42–50 megacycles (mc.). The commission proposed to move it upward in the radio spectrum.

Six weeks of general allocation hearings were held in late 1944, during which time Dr. Kenneth A. Norton, an engineer with the Army signal corps (formerly with the FCC and the U.S. bureau of standards) testified that under his calculations FM would give a better service in the frequencies around 100 mc.

Industry engineers opposed him. They contended there was no quantitative data to bear out Norton's contentions. Leading the opposition was Maj. Edwin Howard Armstrong, professor of electrical engineering at Columbia university, New York, and inventor of frequency-modulation broadcasting.

But despite the industry opposition and in the face of threats of congressional investigation, the FCC on May 25, 1945, issued its final allocation, giving FM 100 channels (each 200 kc. wide) in the spectrum between 88 and 108 mc. Hearings subsequently were reopened on petition of the Zenith Radio Corp., which sought to have a portion of the 42–50 mc. band allocated also to FM. In congress, Rep. William Lemke, Republican of North Dakota, introduced a bill to require the FCC to allocate FM in the 50-mc. region.

The commission subsequently denied the Zenith petition, and Lemke's bill died in committee when the 79th congress expired.

Blue Book.—On March 7, 1946, the FCC issued a lengthy report entitled "Public Service Responsibility of Broadcast Licensees." This document, known as the *Blue Book*, became radio's most controversial issue as between the regulatory federal agency and the broadcasting industry. The *Blue Book* criticized radio generally, accused it of being "over-commercial" and of not broadcasting a sufficient number of "sustaining public interest programs."

Eleven months before the report was issued, the FCC placed on temporary licence a half dozen broadcasting stations. At the time the commission announced it was investigating program logs of several stations to determine whether they were broadcasting in keeping with promises made when their respective applications were filed.

In the *Blue Book*, the FCC said that in future considerations for licence renewals the FCC would give "particular consideration" to four program-service categories which it considered relevant to the "public interest," as follows:

- (1) The carrying of sustaining programs, including network sustaining programs, with particular reference to the retention by licensees of a proper discretion and responsibility for maintaining a well-balanced program structure;
- (2) The carrying of local live programs;
- (3) The carrying of programs devoted to the discussion of public issues;

- (4) The elimination of advertising excesses.

The commission accused five broadcasting stations of "over-commercialism" and of failing to operate their stations according to promises made in applications—some dating back to 1932. Among these stations was WBAL, Baltimore, Md., a 50,000-watt clear-channel station owned by Hearst Radio Inc., subsidiary of William Randolph Hearst's newspaper enterprises.

At the close of 1946 it appeared that the WBAL case would reach the supreme court. In mid-Dec. 1946 Hearst attorneys filed with the commission a petition charging that the FCC staff which compiled the *Blue Book* had made "false, distorting and misleading" references to the Hearst station. The petition demanded "an appropriate retraction of the (*Blue Book's*) unfair accusation against the operation" of WBAL by Hearst Radio, and for "appropriate action" by the FCC "with respect to the person or persons responsible."

The FCC had designated the Hearst licence-renewal application for hearing, after keeping the station on temporary licence, from mid-April 1945. Pres. Justin Miller of the National Association of Broadcasters had assailed the *Blue Book* and the commission since its issuance. He resigned from the U.S. court of appeals for the District of Columbia in Oct. 1945, to accept the presidency of the N.A.B. Miller, who had written several radio opinions as a member of the appellate court, in speeches throughout the United States declared the Communications act expressly forbade the FCC from having anything to do with programs or business practices of broadcast stations.

Court Decisions.—The supreme court, during the decade 1937–46, handed down several interpretations of the Communications act of 1934, as amended.

On March 6, 1940, the high tribunal held that the FCC could not consider economic injury to an existing station in granting a licence to a competitive applicant. That decision held that the commission had no control over the business practices or economics of broadcast stations. On April 6, 1942, the court upheld the right of the U.S. court of appeals for the District of Columbia, to issue stay orders against FCC actions.

On Dec. 3, 1945, the court ruled that the FCC must hold hearings before making decisions in cases where mutually exclusive applications were involved. The FCC had granted one station a licence without a hearing while designating for hearing an application for the same wave length in a near-by community.

On Dec. 9, 1946, the supreme court held that the FCC was empowered to revoke a radio station licence where falsification was involved. The court upheld the commission's action of a year before refusing to renew the licence of WOKO, Albany, N.Y., because a 24% beneficial interest held by Sam Pickard, one-time federal radio commissioner, was not reported to the commission until after the FCC began an investigation some 12 years later.

Performers' Rights

Performing artists as well as composers of musical compositions learned, through court decisions in the United States, that they could protect their own works. The decade 1937–46 found composers of drama and music organized to protect their individual and collective rights.

On a world-wide basis, the Confédération Internationale des Sociétés d'Auteurs et Compositeurs, created in 1926 with headquarters in Paris, had enlarged its scope of operations by 1937 to include musical copyright organizations of many countries. It was the outgrowth of the French Society of Dramatic Authors and Composers.

Annual congresses, held in various European cities, ended with a 1938 meeting in Stockholm. With the advent of World War II, the confederation became somewhat inactive, but in March 1946 the first postwar meeting was held in Paris. By agreement the next international convention was scheduled in Washington, D.C., Oct. 21-26, 1946. It was held in the Library of Congress.

The American Society of Composers, Authors and Publishers (A.S.C.A.P.), which had been the largest music licensing organization in the U.S., became a member of the confederation, and was host to the world meeting in Washington, D.C., in 1946.

As 1937 began, radio stations in the U.S. were faced with paying a sustaining fee plus 5% of their gross receipts if they continued to use music on which A.S.C.A.P. held the copyright. With fees for broadcasting music rising at a rapid rate, the National Association of Broadcasters undertook a study. A bureau of copyrights, meantime, had been established by the N.A.B. to advise broadcasting stations on the use of music. Several U.S. stations were threatened with suits if certain musical compositions, owned by A.S.C.A.P. members, were played without paying additional fees. As a result of the monopoly, the N.A.B. board of directors on April 1, 1937, authorized the creation of the radio industry's own music copyright bureau. By early 1940 it was functioning as Broadcast Music, Inc., with a \$1,250,000 fund supplied by the major networks and independent stations of the country. A permanent organization was formally approved at the 1939 N.A.B. convention in San Francisco the following August.

A.S.C.A.P. early in 1940 proposed new contracts for stations and networks, boosting its royalties from an estimated \$4,500,000 to \$9,000,000 annually. Radio stations refused to sign. On May 10, 1940, the department of justice instituted criminal action against A.S.C.A.P. for alleged violation of the Sherman Anti-Trust law. The following December, Attorney General Robert H. Jackson filed new criminal antitrust suits against A.S.C.A.P., B.M.I., NBC and CBS, as a result of the music controversy. By 1941 radio stations throughout the U.S. were allowing their A.S.C.A.P. contracts to expire and were broadcasting B.M.I. music. A.S.C.A.P. members and officials felt that the impact would result in public reaction, but the millions of radio listeners in the United States apparently were unperturbed. The expected protests did not materialize.

On Jan. 31, 1941, B.M.I. signed a consent decree to cease and desist from price fixing or any other purported violations of antitrust laws, to become effective when A.S.C.A.P. signed a similar decree. A.S.C.A.P. subsequently signed, but not before a federal court found the organization guilty of criminal violation and fined it \$35,250.

Prior to the N.A.B. convention in the spring of 1941, Mutual Broadcasting system signed a new contract with A.S.C.A.P., breaking the deadlock between stations and networks and the copyright organization. The figure was 3% of its receipts for musical programs. Later in the year, NBC and CBS signed at 2¾% and A.S.C.A.P. lowered Mutual's fee. A.S.C.A.P. offered its music to independent stations at 2½%.

With a \$1,000,000 annual budget, B.M.I. approved long-term contracts at a 25% reduction to radio stations. With competition between two major copyright organizations, fees came down and the radio industry had a wide selection of music as the decade closed.

The decade saw two opposite court decisions involving the right of radio stations to broadcast recorded music of performing artists. On Oct. 8, 1937, the Pennsylvania supreme court held that performing artists had a property

right in their recorded performances of musical compositions and therefore radio stations had to obtain permission from the artists before using their records. The decision was in the two-year-old case in which the National Association of Performing Artists brought suit against WDAS, Philadelphia, charging that the station broadcast phonograph recordings of music made for home consumption.

In July 1940 however, the U.S. circuit court of appeals upheld the right of radio stations to broadcast phonograph records without paying licence fees to the performers. The supreme court refused to review the appellate court decision, in effect permitting the lower court's ruling to stand.

Property rights of radio dramas were upheld by the circuit court of appeals sitting in Richmond, Va., on Jan. 5, 1942. The Lone Ranger, Inc., owners and originators of *The Lone Ranger* radio program, broadcast on various networks and by transcription throughout the U.S., Canada and Hawaii, had brought suit against Wallace Brothers circus and Lee Powell, an actor, seeking to restrain Powell from representing himself as "The Original Lone Ranger."

Powell had appeared as Allan King, in the motion picture, "The Lone Ranger," produced in 1937. The court decision was hailed as a milestone in legal protection of radio property. The court ruled that the Lone Ranger, Inc., was entitled to protection against unfair competition or "filching" of scripts, personalities or characters.

World Conferences

In the decade 1937-46, one major International Telecommunications conference and several regional meetings by continents and hemispheres were held. They included the following:

The First North American Regional Broadcasting conference in Havana, Cuba, ending Dec. 13, 1937, resulted in a treaty of vital importance to the western hemisphere; the Second North American Regional Broadcasting conference in Washington, D.C., ending Feb. 25, 1946, led to a three-year extension of the North American Regional Broadcasting agreement (N.A.R.B.A.) and adoption of a *modus vivendi*.

The International Telecommunications conference in Cairo, Egypt, Feb. 1 to April 8, 1938, resulted in worldwide radio regulations; it was attended by 285 official delegates from 71 countries and colonies.

The Third Inter-American Radio conference, embracing countries of the western hemisphere, in Rio de Janeiro, Brazil, was held in Sept. 1945.

The United Kingdom-U.S. Telecommunications conference in Bermuda, closing Dec. 4, 1945, resulted in equality of international press communications rates between the British empire and U.S.

The Five-Power Telecommunications Preparatory conference in Moscow, U.S.S.R., Sept. 28-Oct. 21, 1946, made preparations for the World Telecommunications conference, scheduled for July 1, 1947.

The Five-Power High-Frequency (short-wave) conference in Paris, Oct. 28-31, 1946, laid the foundation for a worldwide high-frequency broadcasting organization, the first in history.

The United Nations Telecommunications Advisory committee meeting in Nov. 1946 made recommendations for a world-wide radio network to be operated by the United Nations.

Each regional conference was important to the countries directly affected, but the most important in world-

wide radio broadcasting was the Cairo convention. Here the nations of the world reviewed the entire radio spectrum, made new allocations and drew up new regulations. It was the first international telecommunications conference since the Madrid convention of 1932, and the fifth such assembly in history. Next in world importance was the Moscow Five-Power conference in the fall of 1946.

The various conferences and their relationship to radio broadcasting are discussed in the following chronological order:

North American Radio Conference.—(Havana, March 29, 1937). This was a meeting preliminary to the First North American Regional Broadcasting conference in late 1937. It marked the first time that nations of the North American continent, whose radio problems were mutual, had gathered to discuss ways and means of eliminating intercountry interference and to assure that each nation might use its radio facilities to the fullest degree.

Delegates from Canada, Cuba, the Dominican Republic, Haiti, Mexico and the U.S., after considerable discussion, agreed on the technical principles of broadcast allocations, thereby paving the way for a full treaty conference the subsequent November.

First North American Regional Broadcasting Conference.—(Havana, Nov. 1–Dec. 13, 1937). To the North American continent this was the most important international conference of the decade. Arising from open discussions by delegates of the six countries involved, a note of solidarity was sounded in the redistribution of radio channels. Interference between stations of Mexico and the U.S. and between Cuba, Mexico and the U.S. was abolished as a result of that meeting.

On Dec. 13, 1937, the North American Regional Broadcasting agreement (N.A.R.B.A.) was perfected as the first such arrangement among the North American nations. Under the N.A.R.B.A., high-powered stations on the Mexican border which had been flourishing for some years were eliminated. For a period of years prior to adoption of N.A.R.B.A., so-called "wildcat" broadcasting stations, operating on choice clear channels and with powers of 50,000 watts or more, broadcast from transmitters located just south of the U.S. border in Mexico. In many cases, studios were situated in the U.S.—in southern Texas cities, but the actual transmitters which blasted out powerful signals were in Mexico. Most of those stations were owned by Americans who had been granted concessions by the Mexican government. Some of them had been denied licences by the Federal Radio commission in the U.S. and had established stations just across the border in Mexico.

Under protection of the Mexican government, these "wildcat" stations flourished and set up considerable interference with U.S. stations. In the redistribution of radio channels (frequencies) by N.A.R.B.A., new standards of engineering were adopted, and the signatory nations agreed that no high-powered clear-channel station could operate on the border of any country in which other radio stations were operating on similar frequencies. A total of 106 radio channels were set aside in the spectrum from 550 to 1600 kilocycles. These channels were divided as follows: 59 were designated as clear channels; that is, channels on which high-powered stations could operate with no interference from other stations on the same channel.

Forty-one of the channels were designated as regionals, on which the maximum power was to be 5,000 watts. The remaining 6 became locals, with power not in excess

of 250 watts. The following frequencies, listed in kilocycles, were designated as clear channels: 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 940, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570 and 1580. Regional frequencies were set aside as follows (listed in kilocycles): 550, 560, 570, 580, 590, 600, 610, 620, 630, 790, 910, 920, 930, 950, 960, 970, 980, 1150, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1350, 1360, 1370, 1380, 1390, 1410, 1420, 1430, 1440, 1460, 1470, 1480, 1590, 1600. The following 6 frequencies, listed in kilocycles, were designated as local channels: 1230, 1240, 1340, 1400, 1450, 1490.

Under the N.A.R.B.A., each signatory nation was permitted to use all of the 106 channels when technical conditions with respect to interference to established stations were such as to render such use practicable. Class I-A clear channels were allocated to the various countries which needed such stations: United States, 25 class I-A channels, (those on which only one station might operate at night); 32 class I-B channels, on which other stations might operate with low power but which had to shield their signals against the dominant stations.

Canada and Mexico were each assigned six class I-A clear channels, while Cuba was allotted one. This resulted in Cuba later filing protest and demanding the use of other clear channels. (This protest and the subsequent outcome is discussed below under the Second North American Regional Broadcasting conference.)

The United States was the first nation to ratify the N.A.R.B.A., the senate approving the treaty on June 15, 1938; on June 30, 1938, it was formally ratified by Pres. Franklin D. Roosevelt. Ratification of the United States was deposited with the government of Cuba on July 21, 1938, and on Jan. 23, 1941, it was proclaimed by the president.

On Oct. 31, 1938, the government of Cuba formally approved the treaty and ordered a reallocation of frequencies in conformity thereto. Canada approved it on Nov. 29, 1938. The Mexican senate on Oct. 26, 1938, declined to ratify the instrument. A year later, however, on Dec. 29, 1939, the Mexican congress formally ratified the treaty, paving the way for placing it in effect. On March 29, 1941, the North American Regional Broadcasting agreement became effective.

International Telecommunications Conference.—(Cairo, Feb. 1–April 8, 1938). Some 400 representatives from 71 countries and colonies attended this, the fifth such international conference on telecommunications in world history. As stated earlier, the nations were represented by 285 official delegates. In addition, 80 representatives attended from 42 operating organizations as well as 27 observers from 14 nonoperating organizations. The United States delegation, headed by Senator Wallace H. White, Jr., Republican of Maine, numbered 60 with staff.

Hassan Sabry Pasha, Egyptian minister of communications, was unanimously elected president of the conference. He immediately named committees to do the preliminary work and make recommendations.

As a result of the Havana meetings in 1937, a group of governments from the Americas proposed that the international short-wave band be expanded to include frequencies from 6000 to 25000 kilocycles. Directive antennas to protect various countries from interference of other nations using the same short-wave channels were discussed in the technical committee, of which White was chairman.

Britain attempted to suppress the commercial broadcasts which literally boomed into the British Isles from stations in France and Luxembourg, by introducing a proposal that no wave band from 160 to 1500 kilocycles could be used by any country in Europe for transmitting "commercial publicity" sent in any other language but the national language or languages of the country originating the broadcasts. The proposal lost by a 17-17 tie vote.

The Cairo conference did extend the broadcast service band, making available several additional international short-wave channels over which various countries could broadcast their own propaganda and beam it to all parts of the world. The following broadcast bands were added to the radio spectrum by the Cairo conference: 25,600-26,600 kc., broadcasting; 26,600-27,500 kc., fixed services on world basis, broadcasting for the U.S.; 27,500, 28,000 kc., radio air soundings; 28,000-30,000 kc., amateurs; above 30,000 kc., regional broadcasting in the Americas and in Europe; 30,000-32,000 kc. low-power stations; 32,000-32,500 kc., maritime beacons; 32,500-50,000 kc., aeronautics; 40,000-40,500 kc., fixed and mobile services; 40,500-58,500 kc., television and low-power stations.

The spectrum from 150-160 kc. was retained for mobile services. The conference allocated to Central American countries for tropical radio use, the band from 4,775-4,895 kc., and assigned to the rest of the tropical regions of the world the band from 4,835-4,965 kc. These short-wave allocations were added to those already in effect since the Madrid conference of 1932: 6,000-6,200 kc.; 9,500-9,700 kc.; 17,750-17,850 kc.; 21,450-21,750 kc.

U.S. newsmen in the White House pressroom on Dec. 7, 1941, as they listened to radio reports of Japan's opening move in World War II

Following the lead of the United States, which earlier had extended the standard broadcast band to 1,600 kc. (the band previously had ended at 1,500 kc.), the Cairo conference agreed to widen the standard band for European use, extending it from 1,500 to 1,600 kc.

Before adjourning, the Cairo conference agreed to hold the next World Telecommunications conference in 1942 in Rome, but of course World War II interfered. The next world conference was scheduled to begin July 1, 1947.

There were regional telecommunications meetings at intervals following the Cairo conference, but nothing on a world-wide or even hemispheric basis until after the fall of Germany in May 1945. On May 7, 1945, the United Nations Conference for International Organization, meeting in San Francisco, pointed to the need for the World Telecommunications conference at an early date and for the free exchange of news and views by all media of mass communication, including short-wave radio, between nations.

Third Inter-American Radio Conference.—(Rio de Janeiro, Sept. 3-24, 1945). This conference was called primarily to discuss rate differentials in various North and South American nations for handling international communications. It developed, however, into an important broadcasting conference, with the Cuban delegation demanding that the Americas draft a new North American Regional Broadcasting agreement.

Canada proposed that the N.A.R.B.A. be extended for two years beyond its expiration date of March 29, 1946. The United States suggested a one-year extension, proposing that in the meantime the Second North American



Regional Broadcasting conference be held. Cuba remained adamant, demanded use of some 20 standard broadcast channels, most of them less than 1000 kc.

As a sidelight to the Rio conference, a group of South American broadcasters laid the foundation for the Inter-American Broadcasting association. They proposed that private industry band together to promote a closer relationship between the nations of North and South America and to resist government encroachment in the field of private broadcasting. The association was proposed by Uruguay and concurred in by Cuba, Mexico, Argentina and several other South American countries. The organization was perfected at a meeting in Mexico City, Sept. 28, 1946.

Bermuda Conference.—(Nov. 21–Dec. 4, 1945). This conference, between the United Kingdom and the United States, had to do exclusively with international communications rates and resulted in the Bermuda agreement, whereby costs of transmitting press messages were equalized by the United Kingdom and the United States. Delegates attended from the United States, the United Kingdom, Canada, Australia, New Zealand, Union of South Africa, India and Southern Rhodesia.

Second North American Regional Broadcasting Conference.—(Washington, D.C., Feb. 4–25, 1946). This conference began as an engineering meeting to discuss minor alterations in engineering standards pending adoption of a new North American Regional Broadcasting agreement. Cuba, however, served notice at the outset that it was prepared to negotiate a new treaty to replace N.A.R.B.A. at its expiration on March 29, 1946.

The United States and Canada opposed a new treaty. Mexico came prepared either to extend the old N.A.R.B.A. or to draft a new one. After two weeks of heated debate, Dr. Luis Machado, vice-chairman of the Cuban delegation, announced that Cuba could not go along with the other nations on extending the N.A.R.B.A. The Cuban delegation was instructed to return home. North American nations, particularly the United States and Mexico, saw untold interference with their own broadcasting stations should Cuba take frequencies at will.

Then followed a series of informal meetings, with T. A. M. Craven, former member of the U.S. Federal Communications commission, who helped draft the original N.A.R.B.A. in Havana, serving as unofficial mediator.

Cuba wanted to use the frequency 640 kc., on which the Bahamas' only station was operating. The Bahamas objected vigorously. A compromise was reached, however, whereby Cuba relinquished its only clear-channel frequency, 1540 kc., to the United States, and in turn received 640 kc. The U.S. then gave the Bahamas clear-channel privileges on the 1540 kc. channel. The switch was completed by Aug. 1, 1946.

Meantime, Cuban stations began intolerable interference on some frequencies in Mexico and the United States. Hardest hit in the U.S. was the channel 630 kc., a regional frequency on which several 5,000 watt stations were operating in the U.S. During the N.A.R.B.A. conference, U.S. station owners protested to the Federal Communications commission; Mexican stations also objected.

On Feb. 25, 1946, Canada, Cuba, the Dominican Republic, the Bahamas, Newfoundland, Mexico and the United States signed an interim agreement, granting concessions to Cuba and extending the N.A.R.B.A. to March 29, 1949. The agreement provided that the various governments make immediate preparations for the Third North

American Regional Broadcasting conference. Canada extended an invitation to meet there on Sept. 15, 1947. But as 1946 closed, the date was moved up to Jan. 2, 1948.

A group of U.S. industry radio engineers met with Federal Communications commission engineers in Washington, D.C., in late Nov., 1946, to prepare U.S. proposals for the forthcoming conference. Engineers in each of the other countries held similar meetings.

Five-Power Telecommunications Conference.—(Moscow, Sept. 28–Oct. 21, 1946). At the Rio conference of 1945 United States delegates proposed informally that the Union of Soviet Socialist Republics might well extend an invitation to the next World Telecommunications conference, to be held some time in 1947. Soviet observers attending the Rio meeting offered the counterproposal, however, that the United States issue the invitation because of disruptions in Europe.

Consequently it was agreed that the U.S.S.R. would invite the United States, the United Kingdom, France and China to a five-power preliminary conference. But months passed and no word came from Moscow. The United States, therefore, notified the Bern bureau of the International Telecommunication union that it would entertain a proposal to hold the next World Telecommunications conference in or near Washington, D.C., beginning about April 1947. Under the Madrid convention it was necessary to have the assent of at least 20 countries to call a conference.

When 20 countries had assented, the U.S.S.R. issued an invitation for the five-power conference in Aug. 1946. Because of the lateness of time the United States and others requested a postponement, which the U.S.S.R. granted. Accordingly on Sept. 28, 1946, delegates of the five sovereign states assembled in Moscow.

That conference was marked by harmony throughout, with the exception that the United Kingdom opposed holding the next world conference in the United States. British delegates insisted it be held in Europe, although Russia, China and France supported the United States. The conference decided that the improvement of the organization of radio communications and the reallocation of radio frequencies to maritime, aeronautical, long-distance land services, broadcasting and other purposes were particularly urgent problems.

A recommendation to convene the next World Radio-communications conference on May 15, 1947, was adopted. The conference also set July 1, 1947, as the date for the next World Telecommunications Plenipotentiary conference and, on motion of the U.S.S.R., agreed to convene a plenipotentiary conference every four years thereafter.

One of the most important recommendations of the Moscow conference was a proposal (submitted by the United States) for the establishment of an international board for the registration of frequencies. Operation of such a board would reduce mutual interference between the radio stations of the world. Another proposal, also submitted by the United States, that the existing International Telecommunications union (I.T.U.) be reorganized and enter into relationship with the United Nations was adopted. An administrative council for the I.T.U. would be formed to include a bureau to control the administrative and technical work of the union. The conference also adopted a recommendation that the seat of the I.T.U. be at the headquarters of the United Nations. Under the recommendations of the five powers, the I.T.U. would be co-ordinated with the U.N. but actually would function as a separate administrative body.

During a meeting of a subcommittee on allocations,

headed by Capt. Paul D. Miles, chief of the frequency service, allocations division, U.S. Federal Communications commission, heated debate arose over extension of the international short-wave band to provide for more radio stations. The U.S.S.R., United Kingdom and France proposed that certain frequencies be taken from the amateurs and allocated to international short-wave broadcasting. With the U.S.S.R., Britain and France all increasing their propaganda broadcasts, beamed to all parts of the world, they insisted that more radio channels were needed. The United States delegates, however, supported by China, opposed additional short-wave channels. Delegates of those two nations expressed the belief that to deprive the amateurs of the frequencies would, in effect, deny the broadcasting industry as a whole valuable propagation information which the amateur operators were able to gather in quantity. Although no formal proposal was made, some members of the United States delegation suggested that all international short-wave stations should be operated in the future by the United Nations, with time allotted to each country for specific broadcasts.

When the United Nations general assembly opened Oct. 23, 1946, at Lake Success, N.Y., the United States made available its international short-wave radio stations for the broadcast in various languages of the important sessions. The U.N. also used the radio to keep the world informed of its progress.

Paris High-Frequency Conference.—(Paris, Oct. 28–31, 1946). This conference followed the five-power assembly in Moscow and was called primarily to discuss the international short-wave situation, which had become acute following World War II. During the war, as the axis countries and satellites fell, the Allied nations expropriated various frequencies used by the axis nations. As a result, the end of 1946 saw considerable interference in some quarters of the world. The United States was using some 50 or more frequencies, although under the Madrid convention half that number was officially assigned. Great Britain and the U.S.S.R. likewise were using more than their share as assigned by the Madrid convention.

It was generally agreed at the Paris conference that the solution rested in a world-wide high-frequency conference—the first of its kind ever held. The delegates (U.S.S.R., United Kingdom, France, U.S. and China) adopted a recommendation to call a world-wide short-wave broadcasting conference in 1947, to follow the Radiocommunications conference, scheduled to open on May 15.

Meanwhile, the short-wave stations of the world were being operated by the various governments at the close of World War II. Prior to the war, the stations of the United States were operated by private industry. After the U.S. entered the war, however, the Office of War Information (OWI) was established and by agreement took over the programming of the various stations (18 at the outbreak of war). When World War II ended, the United States was operating 36 short-wave stations on 56 frequencies. When OWI was dissolved by President Truman in late 1945, its informational functions were transferred to the state department, which continued to operate the short-wave stations, although the latter were licensed by the Federal Communications commission to private industry.

For many months the U.S.S.R. had objected to the broadcast of Russian-language programs by either Great Britain or the United States, unofficially, on the grounds that the soviet people were told what the soviet government deemed best for them, and that presenting a variety of facts might confuse their minds. Nevertheless, Great Britain began the broadcast of Russian-language programs

in the summer of 1946. France announced similar intentions, but at the close of 1946 had not begun the programs. The United States got Russian-language broadcasts under way shortly after the end of the decade—on Feb. 17, 1947. William Benton, assistant secretary of state in charge of cultural affairs, conferred in Moscow with soviet officials regarding an interchange of students between the U.S.S.R. and U.S.A. Meanwhile the soviet union was broadcasting several hours daily in the English language and beaming the programs to English-speaking nations, including the United States.

(J. N. B.; R. W. CR.; S. T. F.)

Scientific Developments

Considerable technical progress was made in radio during 1937–46. The principal progress in the fields of propagation, navigation, tubes, frequency modulation and facsimile is summarized in the following sections.

Radio Wave Propagation.—Major progress in this field was in research and correlation of results of ionosphere studies and the application of this knowledge to commercial operation of radio transmitting and receiving equipment. Prior to 1937 the engineering design of radiating systems (antennae), particularly for generating and collecting medium and high-frequency radio waves, had been hindered by lack of such knowledge and information. It was now possible to design radiating systems in accordance with the principles derived by research to utilize the propagation phenomena for most efficient radio use.

There are three general forms of wave propagation—surface or ground wave propagation, skywave propagation by reflections from the ionospheres, and optical or quasi-optical propagation.

Ground waves are utilized for the lowest radio frequencies, from 10 to approximately 3000 kc. For a given radiated power over typical land surfaces, the rate of decay of signal strength *v.* distance, increases with frequency and with the average resistivity of the soil or earth. Over sea water, the rate of decay is much lower than that of the best earth because of the relatively low resistivity of salt water, so that much greater distances can be covered with given power over sea than over land. Ground waves are so called because their utilization depends upon the nature of the electromagnetic fields at the boundary between the wave in the atmosphere and the accompanying ground currents propagated in the earth below it. For most effective utilization the wave must be vertically polarized; *i.e.*, the electric vectors lie in vertical planes extending in the direction of propagation.

Skywaves are so called because they are propagated in space above the earth and reflected earthward from regions of high free-electron density in the upper atmosphere called ionospheres. The ionospheres thus act as imperfect mirrors for radio waves roughly between 500 and 30,000 kc. Typical propagation over great distances may involve several reflections between earth and ionosphere before arriving at a distant receiving point. The waves travelling in the atmosphere between these boundaries decay at a rate which is inversely proportional to distance. The reflection coefficient of the ionosphere depends upon the particular layer used, the frequency, the angle of incidence and the immediate state of ionization in the ionosphere layer, this latter being dependent upon solar ultraviolet radiation, sunspot activity and the consequent state of the earth's magnetic field. The layers are seriously disturbed by sunspots, magnetic storms and aurora borealis.

The ionosphere layers were studied very extensively by adaptation of radar principles, two principal layers were found, these were designated as the E and F regions, the latter was divided into two normal layers during local daylight hours called F_1 and F_2 . Other layers often exist transiently. The E layer exists during daylight only, and has a stable height of approximately 170 km. At night there is one stable F layer with a nominal height of the order of 300 km. After local sunrise, sunlight ionization of the upper atmosphere causes the formation of the E layer, and the break-up of the nighttime F layer into the F_1 at roughly 230 km. average height and the F_2 at heights from 325 to 450 km. After local sunset, deionization commences with the disappearance of the E layer, and the convergence of F_1 and F_2 layers into the F which alone remains throughout the hours of darkness. Just before local sunrise, the electron density in the ionosphere is at its lowest and transmission during this period requires much lower frequencies and much higher power than at other times of the day.

There are critical frequency waves which penetrate these layers and are not reflected. The optimum working frequency for radio transmission is usually 15% below the critical frequency for normal incidence at the point of reflection. This optimum frequency varies throughout the day and night, necessitating changes in operating frequencies over fixed radio circuits for best transmission efficiency. The Central Radio Propagation laboratory of the national bureau of standards, co-operating with agencies throughout the world operating continuous ionosphere sounding stations, continued to compile and publish complete ionosphere data monthly during the decade.

Medium-frequency broadcasting (550-1600 kc.) provides primary service with ground waves and sometimes an intermittent skywave service at night. Usually skywaves and ground-waves overlap at distances from 35 to 100 mi. from a broadcast station where severe rapid fading results at night. Skywaves between stations are also a serious source of interference. The years 1937-46 saw great strides in the development, design and installation of special directive antennae to permit several broadcasting stations to operate on the same frequency satisfactorily.

At frequencies above those which are reflected by the ionosphere (roughly above 30,000 kc.) radio propagation becomes optical or quasi-optical in character. Within radio-optical line of sight, signals are propagated in the space immediately above the surface of the earth, by direct optical transmission. Because of the very narrow angles subtended by practical heights of transmitting and receiving antennae at distances of several miles, the received wave is the composite of the ray transmitted directly in free space, and one or several rays which have been reflected from the ground, the latter of opposite phase and very nearly the same amplitude. High resultant field strengths at distant points are obtained only by providing circuit geometry which will avoid this normal tendency to complete cancellation near the ground so that the distance travelled by the reflected ray is at least one-sixth wave length greater than the direct ray. The lower the frequency, the higher must be the transmitting and receiving antennae above the ground level to achieve this.

Beyond the radio-optical horizon, the field present is due to diffraction. At frequencies below about 150,000 kc., useful service can exist in the diffraction region, thus extending the distance which can be covered from a given antenna height. Above this frequency the diffraction zone

virtually vanishes, and transmission distance approaches that of the optical horizon. It was found that frequencies above about 5,000 mc. are affected by meteorological conditions and the state of the atmosphere which produce transient mirage effects, absorption and dispersion.

Radio Navigation for Sea and Air.—During the decade vast numbers of radio navigational systems, primarily for use as aids to aviation, were proposed. Both war and peace made demands upon engineers for methods of removing the fundamental obstacles to all-weather flying and instrument landing and for safety of life and property. Of the many systems proposed, only a few could find wide application because of the need for broad standardization within a country and preferably throughout the world. After 1944 most of the nations united in the Provisional International Civil Aviation organization (P.I.C.A.O.) for the purpose of standardizing equipment and procedures for international aviation, including radio navigational and instrument landing aids. In 1946 extensive demonstrations were made in England, the United States and Canada of many systems prior to the P.I.C.A.O. deliberations leading to adoption of preferred systems.

Radio navigational systems were broadly classified as radial(R-O), hyperbolic and pictorial. The radial systems provide linear course guidance, and position by triangulation with two or more separate radial courses. The hyperbolic systems provide courses or line of position which are generally curved in the form of hyperbolas, and position is determined by the intersections of two or more hyperbolic lines of position. The pictorial systems are those which present to the navigator a map or "picture" of the surroundings and his position on that map. The latter was the latest type of system.

Under the radial system were included the following systems actually placed in use:

Radio direction finding by means of manual and automatic radio compasses, used by ships and aircraft for many years.

The CAA four-course low-frequency radio range system, used throughout the United States and Canada, and during World War II extended throughout the world. (Short and medium distances depending upon natural noise levels.)

The CAA two-course very high-frequency aural-visual radio range, used on portions of the United States airways. (Short distances.)

The CAA very high-frequency omni-directional radio range (originally developed and proposed by the Radio Corporation of America), providing an unlimited number of radial courses. (Short distances.)

The U.S. army SCS-51 and the CAA Instrument Landing system runway localizer and glide path systems, providing lateral and vertical linear guidance for landing aircraft. (Very short distances.)

The Sonne system of angularly moving radial equisignal linear courses developed in Germany and using the low frequencies. It is a long-range navigational system, using the triangulation between two stations to give a fix.

Under the pictorial system were the following systems, one of which was in use and the other in development at the end of 1946:

The plan-position-indicator form of microwave radar system for use on ships, whereby reflections from objects on or above the water reflect radar echoes which are luminously displayed in the form of a map on a cathode-ray indicator tube, with the ship as the centre of the map. It was put in use on ships, for navigation in coastal areas and for collision prevention.

The Teleran system, proposed by Radio Corporation of America, used an integrated system of ground-search radar, altimeters in the aircraft and television to display, on the ground and in each aircraft, a selected map of any of a number of vertical strata showing navigational, meteorological, traffic, ground-controlled traffic instructions and geographical information on a cathode ray tube; and in the aircraft to identify one's own aircraft with respect to all others. This system was being developed for the U.S. army at the end of the decade.

Other special aids were required, such as position marker beacons, radiophares, radio altimeters and distance-measuring equipment. The latter, utilizing the principle of transponders, or pulse repeaters, made use of the echo-time for radar pulses transmitted from the aircraft to a ground point and return, and displayed as a direct reading of distance. When used with a radial navigational system the navigator was provided with both azimuth and distance from a station on the ground. Such a system combination gave the polar co-ordinates of the aircraft's position with respect to the ground station and was therefore classified as a radial system.

Under the hyperbolic system were the following systems actually in use (omitting reference to a large number of proposed systems not in use at the end of the decade):

The loran system (long range navigation), using the principle of measuring the time-difference of arrival of synchronized pulses from two or more geographically separated transmitters, using medium frequency.

The Gee system (British) of time-difference measurement of synchronized pulses from three transmitters spatially separated, for short-range navigation, using very high frequencies.

The low-frequency loran system, (U.S.) similar to the preceding but using much lower frequencies.

The Decca system of navigation (British) using low frequencies and operating on a phase-comparison method of indication.

Tubes.—During the decade, tubes were improved materially, both in terms of power output and operating frequency. The ability to generate more power at higher and higher frequencies was due to improvements in triodes and tetrodes and the introduction of tubes operating on new principles.

Triodes and Tetrodes.—In the generation of power at high frequencies with conventional triodes and tetrodes, the dimensions of the electrodes must always be a fraction of a wave length. Thus, as the frequency increases (or the wave length decreases), the physical dimensions of the tubes become smaller and consequently the ability of the tubes to handle power decreases. For any given method of cooling, the power output should vary with the inverse square of the dimensions of the electrodes. On this basis the power-handling ability of tubes can only be increased if the method of cooling the electrodes can be improved or if electrode materials can be found which will stand a higher thermal loading. During the years 1937–46, tube power ratings at any given frequency increased because of improvements in electrode cooling. In 1937 for example, it was possible to generate only about 100 watts at 300 mc., whereas in 1946, 5,000 watts could be obtained. Again, at 100 mc. only 500 watts could be generated with one tube in 1937, but in 1946 over 25,000 watts could be obtained.

There were similar advances in the circuit applications of triodes and tetrodes at high frequencies. In 1937 it was difficult to construct amplifiers above 50 mc. as triodes alone were available, and it was often impossible to neutralize them so that the amplifier would not oscillate.

In 1946 tetrodes were available for use up to 300 mc., and triodes had been designed for use in the so-called grounded grid circuit which permitted stable amplification at high power and high frequencies. Triodes were used as amplifiers in the grounded grid circuit at frequencies as high as 3,000 mc.

Transit-Time Tubes.—The greatest advances of the decade in extending the useful frequency spectrum were made by the development of electron tubes in which the time of electron transit was of the order of the radio frequency period. The numerous military radar equipments used during World War II were responsible for greatly accelerating the development of transit-time tubes. Tubes of this general type could be employed as amplifiers and efficient oscillators at frequencies as high as 40,000 mc. (0.75 cm. wave length). Here again physical limitations were encountered since the small size of resonant systems make it impractical to dissipate heat, although no purely electronic limit existed.

Transit-time tubes could be divided into the following four specific types on the basis of their principle of operation.

1. Electron-beam deflection-modulation tubes.
2. Electron-beam velocity-modulation tubes.
3. Multi-resonator magnetrons.
4. Travelling-wave tubes.

The first two types operate on the principle of transferring energy between electrons and radio-frequency fields in a time small compared with one period, and long transit time in regions free of radio-frequency fields is utilized to accomplish the desired results. The operation of the last two types is dependent upon the more or less continuous transfer of energy between electrons and radio-frequency fields travelling at almost equal rates. The energy transfer may occur during a period amounting to several radio-frequency cycles. The following paragraphs describe the basic method of operation of each of the four types.

Beam-Deflection Tubes.—In this type of tube a beam of electrons passes between deflecting plates connected to the radio-frequency circuits. The beam is therefore laterally deflected by the varying radio-frequency potential, and the deflected beam is caused to impinge on separate collector plates during opposite half cycles. By suitable design of the collector structure, the tube may be used as an ultra high-frequency detector, mixer, frequency multiplier and, with proper feed-back connection, as an oscillator.

Velocity-Modulation Tubes (Klystrons).—Velocity-modulation tubes operate by using the radio-frequency field between two grids to vary the velocity of electrons passing through these grids. The electrons are then allowed to drift in a region free of radio-frequency (r.f.) fields until they are "bunched." This bunching occurs because electrons passing through the grids early in the radio-frequency cycle are retarded, those passing when the r.f. field is small are unaffected and those passing later are speeded up. The length of drift space is such that at the time of maximum bunching the bunch passes through grids connected to a second radio-frequency circuit. Such a tube acts as an amplifier.

A tube of this type was developed as a "reflex" oscillator in which the field-free drift space was replaced by a retarding direct current field set up between the second grid and a "reflector" electrode. The reflector potential and distance from the grids could be adjusted to bunch the electrons and return them through the grids in proper phase to produce oscillations.

Multi-Resonator Magnetrons.—In a magnetron, electrons emitted from an axial cathode under the influence of a radial D.C. electric field and an axial magnetic field execute spiral cycloidal-like orbits around the cathode. In the multi-resonator magnetron, the anode is formed of many metallic segments connected to suitable radio-frequency resonant circuits. The fringe radio-frequency fields between these segments interact with the rotating electron cloud in such a fashion that there is a net transfer of energy from D.C. electric field to radio-frequency field. The radio-frequency fields between the anode segments may be considered as made up of travelling waves around the electron interaction region, in which the rotating electron cloud moves in synchronism with the radio-frequency wave.

Magnetron oscillators were used as both pulsed and C-W generators at wave lengths from 0.5 cm. to 50 cm. For pulsed tubes the upper limit to peak power at the end of the decade was about 100 kw. at 1 cm., 3 megawatts at 10 cm. For C-W tubes power ratings ranged from 10 kw. at 50 cm. to almost 1 kw. at 3 cm.

Travelling-Wave Tubes.—An experimental travelling-wave tube was announced by the Bell Telephone laboratories. This type of tube obtained its transfer of energy from a moving electron stream to a travelling radio-frequency wave by applying the wave to a helix of iron wire surrounding the electron stream. Because of the reduction in wave-velocity caused by the radio-frequency fields proceeding along the turns of the helix, the electron velocity could be adjusted to exceed slightly the effective wave-propagation velocity down the helix and thereby transfer electron energy to the wave. Useful amplification of 100 to 200 with a band width of approximately 800 mc. was claimed for tubes of this type.

Receiving Tubes.—New tubes were developed which made it possible to produce radio receivers giving satisfactory performance in the microwave region. Improvements in the performance of tubes suitable for the lower frequencies were realized. Some of the more important developments in the receiving-tube field are discussed in the following paragraphs.

The Lighthouse tube, developed primarily for military applications, was useful up to about 4,000 mc. Its name was derived from its general appearance. In this tube a flat disk-shaped grid of wire mesh was interposed between the ends of two cylindrical members forming the cathode and plate electrodes. This construction minimized lead inductance since the cathode and plate connections were simply extensions of these electrodes, and connection to the control grid was made around the circumference of the grid disk just outside the glass to the metal seal. The rigid disk seal construction made possible the close electrode spacing required in order to obtain high mutual conductance. It also provided low plate-to-cathode capacitance required for grounded grid applications.

Beam-deflection tubes were developed for frequency-converter applications (for principle of operation, see above). In such tubes the electron beam was deflected simultaneously by the received signal and local oscillator voltages applied to separate deflection plates. This type of tube made it possible to minimize input electrode conductance.

The Reflex Klystron (see above) was used as the local oscillator in superheterodyne receivers in that portion of the frequency spectrum where conventional types of tubes no longer gave satisfactory performance. This type of tube

operated at frequencies up to approximately 20,000 mc.

The Orbital-Beam tube employed secondary emission principles to obtain improved performance. The input section of the tube consisted of a tetrode having a mutual conductance in the region of 3,000 micromhos. The plate of the tetrode, however, acted as a secondary emitter, having a secondary emission ratio of about 5 to 1 which increased the over-all mutual conductance to 15,000.

During the decade there was a general trend toward reducing the size of many receiving-type tubes. This trend was accelerated by World War II, and large quantities of subminiature tubes were manufactured for the proximity fuse. In many instances the use of miniature tubes made possible a considerable reduction in the over-all size of the equipment.

Special Purpose Tubes.—The Cyclophon, an electronic beam switching tube, was developed by the Federal Telecommunications laboratories. An electron gun, similar to that employed in conventional cathode-ray tubes, produced a narrow electron beam. Electrostatic or electromagnetic deflecting means caused the beam to rotate at constant velocity and to trace a circular pattern on an aperture plate in which were cut a number of uniformly spaced slots or apertures. The number of apertures corresponded to the number of circuits to be switched. Tubes using 8 and 24 apertures were designed. Behind each aperture was a secondary emission dynode. Electrons produced by secondary emission, when the electron beam traverses these dynodes, were collected by the aperture plate. If a series resistance was connected in each dynode circuit a voltage drop would exist across the resistor while the electron beam was traversing the dynode. Cyclophon tubes were employed as pulse generators in time-division multiplexing systems and in switching or commutating circuits.

The Phasitron was a special electronic tube for producing a frequency-modulated signal. The tube required for its operation a crystal-controlled source of three-phase energy at a submultiple of the desired carrier frequency and also a source of modulating energy. It was constructed with focusing electrodes to produce a disk of electrons at right angles to the axis of the tube. Another set of electrodes, energized by the three-phase source, deflected the electrons radiating from the centre of the disk so as to produce rotating radial undulations in the surface of the disk. The intercept of the disk on an imaginary cylinder whose axis was common to the axis of the disk would be a sine wave of a frequency equal to that of the three-phase deflecting source.

The disk of electrons terminated on two concentric cylinders, the innermost of which had a series of rectangular holes so arranged that if the rotation of the disk were arrested at the correct position, nearly all the electrons would pass through the holes to the second cylinder. A half wave displacement of the disk would result in all the electrons being caught by the first cylinder. It was thus obvious that there would be an alternate collection of electrons by the two cylinders which could be used to excite a tuned circuit connected between the two cylinders. Phase modulation of the energy in the tuned circuit connected between the collector plates was accomplished by means of a coil external to the tube with its axis coincident with that of the tube. When this coil was energized from a modulating source, its magnetic flux caused electrons starting at the centre of the disk to be deflected from their normal radial path and produced the effect of momentarily speeding up or slowing down the sine-wave pattern on the collecting cylinders, depending on the polarity of the flux.

Frequency Modulation.—Frequency modulation (FM)

was introduced during the decade as a new sound broadcasting service. In FM the intelligence is transmitted by variation of the frequency of the radiated wave instead of its amplitude as with amplitude modulation. Prior to World War II, the frequency band from 42 to 50 mc. was assigned to FM broadcasting. With the objective of minimizing the effects of propagation vagaries, the Federal Communications commission in 1945 shifted the frequencies allocated for FM broadcasting to the band from 88 to 108 mc. The channel width employed for FM broadcasting was 200 kc. and the maximum deviation was 75 kc.

Two general types of transmitters were employed for FM broadcasting. In the first type the phase of the carrier frequency wave, derived from a crystal-controlled oscillator was varied directly in proportion to the strength of the modulating signal. In order to obtain frequency modulation with this system, the modulating signal was first passed through an attenuating network which caused the output voltage to vary in amplitude inversely proportional to the modulating frequency. A special tube called the Phasitron was developed for use in transmitters of this type (see under *Tubes*, above). In the second type of transmitter the frequency of a self-excited oscillator was varied in accordance with the modulating signal. The variation in frequency was accomplished by means of reactance tubes connected in shunt with the oscillator tank circuit. In order to obtain the desired mean frequency stability in transmitters of this type, the frequency of the self-excited oscillator was compared with the frequency of a crystal-controlled oscillator and some automatic means was employed to correct for the frequency drift which might otherwise occur in the self-excited oscillator.

The receivers developed for the reception of FM signals could be classified into three general types. The first type employed a limiter stage in combination with a balanced discriminator. The limiting action was usually obtained in the intermediate frequency-amplifier stage which preceded the discriminator. The balanced discriminator operated to balance out the effect of amplitude modulation on the received wave. The second type employed a continuously operating oscillator the frequency of which was controlled by the frequency variations of the received signal. The oscillator was responsive to frequency variation only and was not affected by amplitude modulation of the received signal. The output voltage from the oscillator was applied to a discriminator-detector combination. A special discriminator-detector combination known as a Ratio-Detector was employed in the third type of receiver. In this arrangement the output currents from two diodes were caused to flow through a common-load resistor. The sum of the voltages across the resistor was automatically held constant. The potential derived from one diode therefore could not increase without a corresponding decrease in the potential from the other. The audio output voltage was derived from the variation in the voltage across either one of the diodes. Amplitude variations in the received signal caused the rectified current through the common load resistor to change but did not affect the audio output voltage.

Facsimile Equipment.—During the decade 1937-46, the field of facsimile advanced in strides comparable to those of other branches of electronics. During 1937-40, the Radio Corporation of America manufactured home facsimile equipment which brought the morning news to families in several cities of the United States. Wire photo service progressed throughout the world, especially in the United States, where circuits were established by the major news services, whose pictures were received from every major city of the United States and distributed daily to

the U.S. press. Radio facsimile transmissions on a world-wide basis were used commercially during 1936-41. After the United States entered World War II, the army, navy and the Office of War Information (OWI) developed radio-photo networks which encompassed the entire allied world. These world-wide circuits were made technically possible by the development of frequency modulation for the audio spectrum. By using this type of modulation, the carrier of the transmitter was kept 100% modulated at all times, thus decreasing the signal-to-noise ratio which in turn gave pictures with fewer interference lines.

Tape facsimile for wire and radio circuits also saw considerable advancement during World War II and was widely used by both the U.S. army and navy.

After World War II ended, interest was revived in facsimile, and many of the former OWI world-wide circuits were taken over by U.S. communications companies. Broadcasting stations showed considerable enthusiasm in the commercial possibilities of home facsimile, as did many foreign newspapers and governments.

(B. E. Sd.; G. L. Bs.)

Cultural Aspects

The ten-year record of radio broadcasting, in terms of its cultural aspects, was a record as full of as many positive and negative factors as are the electrical particles themselves that make up the broadcasting waves.

For over this decade the world-wide use of radio broadcasting ranged from the extolling of the dubious virtues of dubious medicines, to the furthering of the even more dubious qualities of political tyrannies, to the great symphonies, the great plays and the great ideas of all time brought into the homes of everyone.

The impactful quality of radio—the fact that in an instant great masses of people could be reached in the privacy of their own homes—made radio, in this turbulent decade, the propaganda tool for those who had something to sell to the mass of people, from the sale of carloads of soap flakes to the acceptance of the idea of world domination.

The result was that as an educative force, radio fulfilled its promise largely in those nations wherein the radio structure was not dominated either by state or profit-minded agencies. But in spite of this emphasis upon commercialism in some sectors and propaganda in others, great masses of people were able to hear for the first time, and at practically no cost, the truly great music of all time.

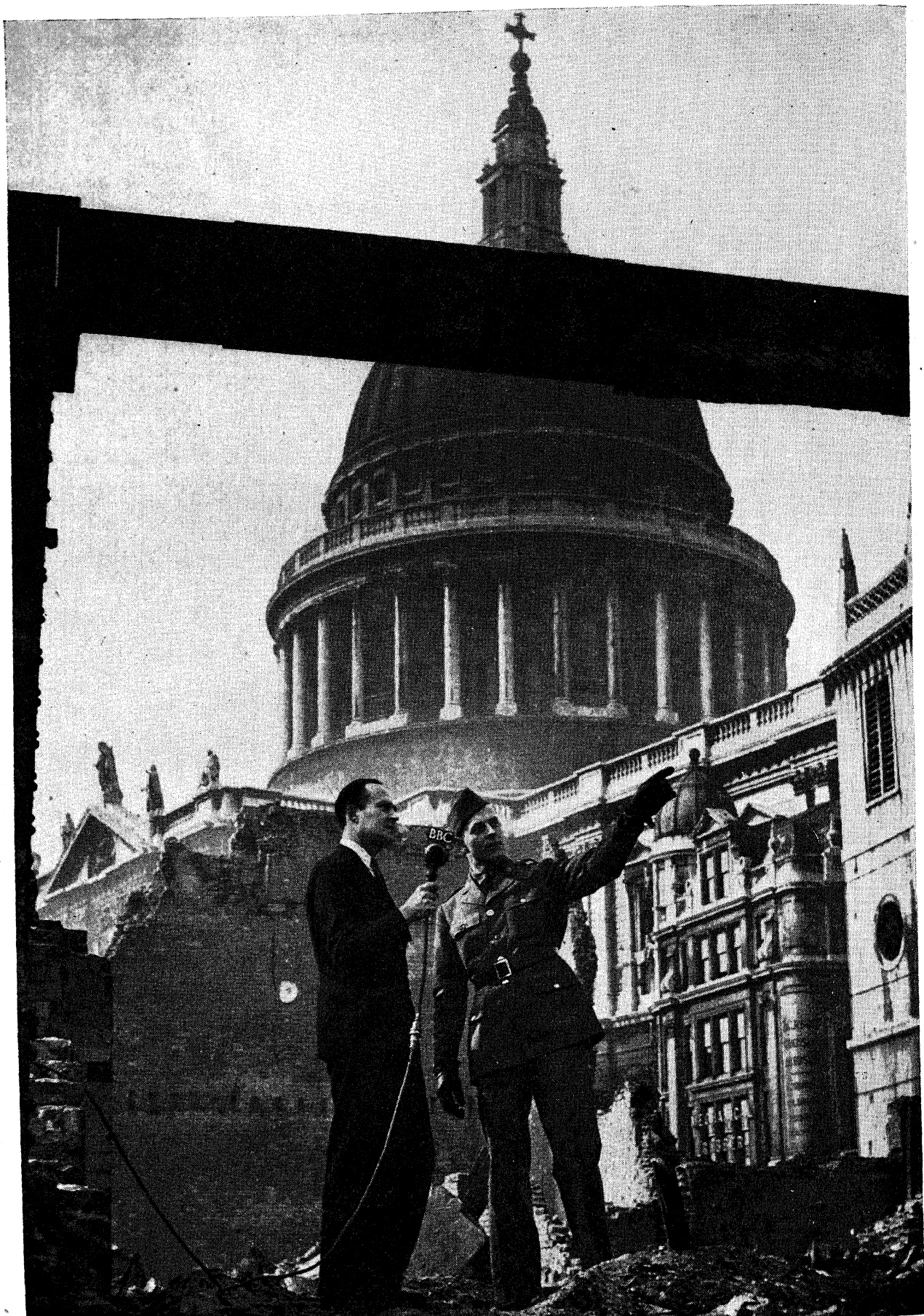
In spite of the infantile dramas of the "villain-still-pursued-her" category, the good of the theatre and the best of thoughtful original radio drama reached the ears of millions. The egomanias of self-styled nation saviours might have misused the microphones—yet simultaneously countless others were reached in their homes by words of statesmanship.

At the close of the decade, technological advances forecast the opening of thousands of interference-free channels, available at low cost to cultural groups, reaching the remotest corners with the good of radio broadcasting.

The succeeding decade, then, could anticipate a greater, more forceful and more mature use of radio broadcasting as a means not only for amusement but also, and most importantly, for the mental growth of the world of peoples anxiously sitting on an atomic time bomb. (A. Or.)

Radio in Other Countries

The beginning of 1937 was noteworthy for several events in the history of the development and application



of radio waves for a variety of purposes. The broadcasting of entertainment and news items had become a necessary adjunct of everyday life in most of the civilized countries of the world; and it was on Jan. 1, 1937, that the British Broadcasting corporation received a new charter whereby it could continue to maintain a service, controlled by government administration but unhampered thereby and free to develop and exploit to the full the technique of broadcasting not only by sound, but also by television. The use of short radio waves from 15 to 100 m. in length for broadcasting on a world-wide basis was firmly established, and the first public television service in the world had just been inaugurated from London. Still shorter radio waves, a few metres in length, had already been applied with considerable success to short-distance radio links forming an integral part or extension of the normal land-line telegraph and telephone system. Progress in the application of radio to communication with ships at sea was exemplified by the equipment fitted in the "Queen Mary," then the latest representative of the class of express passenger liners. The installations on this vessel provided for high-speed transmission and reception, and telegraphic or telephonic communication with both sides of the Atlantic during her normal routine voyages between Europe and the U.S. Amid this wealth of application of known principles, there were being conducted in England, Germany and Italy, the first serious experiments in the technique of radiolocation or radar (*q.v.*)

Broadcasting.—During 1937–46 radio broadcasting progressed in two phases; the first during the period 1937–39, when broadcasting stations in Europe were being developed, installed and arranged according to the international Lucerne plan of 1934; and later when broadcasting became an effective weapon of war for the distribution of news and propaganda as well as entertainment. At the end of 1937 it was estimated that there were nearly 32,000,000 holders of receiving licences in Europe, of whom some 8,000,000 were in Great Britain and Northern Ireland, the latter rising to about 10,000,000 in 1946. To provide for the vast listening population associated with these licences, there was a steady development and improvement in the whole technique of transmitting a broadcasting program, from the design of studios with good acoustic properties to the increase in efficiency and stability of the sending stations themselves.

In order to accommodate as many broadcast sending stations as possible within a given frequency or wave-length band without mutual interference, the carrier frequency of each station must be kept as constant as possible. This technique advanced so much in this period that the frequencies of many of the best broadcasting stations were ultimately maintained constant to better than 1 part in 1,000,000; and as an incidental advantage the waves from such stations could be used as a standard of reference for frequency-measuring purposes. As a result of this technical achievement it became possible to operate two or more stations in different areas of the same country on the same frequency and broadcasting the same program. The high standard attained in this technique in Great Britain by 1939 was put to immediate strategic use on the outbreak of World War II, by grouping all the stations in the country on two wave lengths only, and emitting what became known as the home service.

In this way, axis aircraft were prevented from using the

British broadcasting stations as radio beacons for navigational purposes.

The early period of the war demonstrated the importance of broadcasting for propaganda purposes and for the dissemination of news to axis-occupied countries, as well as for the entertainment of military forces at home and abroad. In view of these facts, jamming systems were developed to prevent listeners from hearing axis transmissions. This naturally gave rise to the development and installation of higher power and more effective transmitters. In Great Britain these developments culminated in the completion of the world's most powerful broadcasting station, capable of delivering 800 kw. to the aerial on either long or medium waves.

Similar developments took place in the use of short-wave broadcasting to considerable distances, such as from England to places outside Europe. While Great Britain was a pioneer in the development of short-wave broadcasting above all in the provision of an empire service, other countries, particularly Germany, Italy and the United States, were active in this field before 1939. During the first year of World War II it became clear that a considerable expansion of the dozen or so short-wave transmitters in Great Britain with output powers of 50 kw., was necessary in order to carry the many and varied programs required as part of the war policy. As a result, the world's largest short-wave broadcasting station was built in 1943 in the north of England: it had 2 separate installations comprising 12 100-kw. transmitters and a system of 51 aerials. With the aid of this station and its previously existing short-wave installations, the BBC could, during the latter years of the war, broadcast simultaneously on 43 separate short wave-lengths and its transmitters were used to radiate not only the "Voice of Britain" to the world, but also the "America Calling Europe" programs, which were relayed by short wave radio beams from U.S. to England.

Associated with this great development of transmitting stations was that of sound broadcasting technique, since it is of great advantage, particularly in short-wave broadcasting, to be able to repeat programs several times within a 24-hour period, in order to suit the convenient listening times in the countries receiving them. Improvements were made in Great Britain in the technique of recording on steel tape and on metal disks coated with cellulose acetate; while considerable advance was made in Germany with a technique of recording on a plastic tape coated with an iron powder film, which offered certain advantages over the steel tape.

(R. L. S-R.)

British and European Programs.—The chief categories of radio programs were all well established, in Great Britain and western Europe at least, when 1937 began. What happened to them during the next ten years? And why? The answers to these two questions were bound up with the whole history of Europe during those appalling and eventful years.

The biggest single influence on the radio program during the greater part of this period came from Germany: it could be summed up in the one word—propaganda. "Without loud-speakers," said Adolf Hitler, "we could not have conquered Germany."

With the help of loud-speakers Hitler hoped to conquer Europe and the world.

The nazis were anticipated by the soviet government in the conscious use of radio as a medium of propaganda to their own and foreign peoples. By 1937 they were far ahead in the vigour and persistence with which they used

On-the-spot broadcast by a U.S. soldier, near St. Paul's cathedral, relating his impressions of the bombed city of London over the British Broadcasting company network in 1942

what seemed to them the medium's most effective possibilities; 1937-41 were the years of their sensational success. Outside broadcasts from mass meetings, marching songs and "front reports" from the advancing German armies, commentaries which purported to come from the air raiders over Britain all helped to build up the picture of overwhelming, ruthless, irresistible German might.

That the German radio lied without scruple or system did not matter to Dr. Josef Goebbels. He was out for quick returns. He exploited to the full the mass emotions of the German people. He exploited to the full the fears and grievances and internecine hatreds of the peoples who were threatened by the Nazi boot. Above all, he exploited the universal passion for quick and precise "news." These were the peak years of Nazi radio programs—the years when false news won enormous audiences because it was first in the field, when glib traitors like Paul Ferdonnet of Stuttgart and William Joyce of Bremen ("Lord Haw Haw") won enormous audiences by their skill in twisting unspoken prejudices and dumb grudges to suit their ends, when the rhythmical tramp and rhythmical songs of the armies of Germany seemed to fill the ether and hypnotize the peoples of Europe into acquiescence or collapse. Goebbels' radio programs may have been crude and repetitive. Their brutal falsity excluded them from any hope of success in the documentary or historical or radio drama fields. The quick returns at which they were aiming were obtained in the fields of outside broadcasting and "news" and propaganda talks, cunningly baited with much first-rate music and many catchy tunes.

These methods assumed quick victory and lived by it alone; from the end of 1941 onward they began to defeat themselves as final victory slipped farther and farther out of the Nazis' grasp. The audience was satiated with propaganda; it was also beginning to doubt. The propaganda programs began to lose their audiences abroad as well as at home. Radio subscriptions began steadily to fall off in the western occupied countries, except in France where more and more people were acquiring sets on which to listen to the voice of London. "Lord Haw Haw's" audiences in Great Britain had thrived on curiosity for some months; they were falling steadily before the year 1941 began. In response to the demands of soldiers and workers more and more space had to be left for jazz and other forms of banned entertainment in the German home programs.

Most significant of all, a mass of evidence showed "black listening" was on the increase among the people of Germany and the occupied countries. The broadcast programs of the British Broadcasting Corporation (BBC) were beginning to make their influence felt on a considerable scale. These programs represented the first authentic answer of free Europe to Dr. Goebbels. They had begun with a tentative whisper in three languages on Sept. 27, 1938. They had been gaining in scope and stature ever since. In 1943 the peak was reached when the BBC disseminated its news in 48 languages and dialects.

It is difficult to estimate the true importance of this influence in Europe. It is impossible to contest its growth from long before the end of 1941, perhaps from the critical days of 1940 when Europe's exiled leaders and rulers such as General Charles de Gaulle, Queen Wilhelmina of the Netherlands, King Haakon VII of Norway and General Wladislaw Sikorski of Poland spoke to their countrymen. Many tributes were paid to these foreign-language services by men and women to whom they brought encouragement and hope in the blackest days. One name may be

cited to symbolize their most outstanding triumph. The brilliant political dialogues and satires of the Free French team of broadcasters headed by Jacques Duchesne had probably never been excelled in their own most difficult and subtle field.

In a different style, "Colonel Britton's" talks, which introduced the famous V-sign, were addressed to the underground movements of Europe.

The English-language programs of the BBC reacted to the stimulus of Dr. Goebbels in even more effective and independent terms. Here was no attempt at direct competition, no effort to out-lie or to out-boast or to out-prophecy. Objective news was the slow but effective answer to "hot" lies. Straight talks, expository or descriptive, critical or hortatory, were the answer to appeals to prejudice and hate. Up-to-date listener research maintained a constant check on what the home listening audience wanted in many fields of culture and information and entertainment.

Thus the BBC's programs met the three great appetites which World War II had immensely sharpened among listeners, without sacrificing its standards of integrity and without ignoring the wishes of audiences in the supposed higher interest of some political scheme. BBC met the hunger for news by a greatly increased stream of factual news bulletins, coupled with large numbers of topical and explanatory news talks, and from 1942 an ever-increasing volume of direct war reporting, culminating in the remarkable series of war reports which were broadcast from D-day to May 1945.

The 6:00 P.M. and 9:00 P.M. British news bulletins of the home service constituted recognized listening "peaks" which could be said with certainty to attract from 10,000,000 to 15,000,000 of the potential radio audience in Great Britain. A news postscript like that of Quentin Reynolds in Aug. 1940 attracted 17,000,000 listeners. A commentary on an air battle off Dover by Charles Gardner in July 1940, attracted 21,000,000. This news service was both vivid and up-to-date; so the announcements of the fall of Keren in Abyssinia (March 27, 1941), of the overthrow of Mussolini (July 25, 1943), of the Paris rising (Aug. 22, 1944), and of the Rumanian capitulation (Aug. 23, 1944), followed almost immediately upon the events and broke the news to the English-speaking peoples. Secondly, they met the need for stimulating and informing the home public by a varied selection of feature programs and talks of all kinds. The "service talks" of John Hilton and many others explained the intricacies of wartime regulations with remarkable success. Feature programs like "The Harbour called Mulberry" (March 1945) attracted an audience of 9,000,000. Any broadcast by Winston Churchill was listened to by 25,000,000 in Great Britain alone.

The success of the "Brain Trust" over several years showed how widespread was the popular desire for general knowledge. Finally the BBC met the human needs of its uprooted audiences in the armed forces with its specialized forces programs, while "Itma" with its seven years of performance was probably the most striking of the BBC's many wartime successes in the light entertainment field.

The end of World War II brought with it a reaction against wartime stresses, and the BBC responded in many various ways. Not that it dropped its objective information service to listeners at home and in Europe. But with the inauguration of the third program on Sept. 29, 1946, it launched a remarkable cultural experiment, which made possible the performance of many full-scale musical and dramatic works running for two hours or more. It returned with added vigour to the development of regional broad-

casts which war needs had reduced to a small scale.

With the lessons of the war and the warning of the Goebbels experiment behind it, its radio programs were setting an example which the free broadcasting organizations of western Europe seemed more and more disposed to imitate in many fields. (See also ADVERTISING; AVIATION, CIVIL; CIVIL LIBERTIES; ELECTRONICS; FEDERAL COMMUNICATIONS COMMISSION; MUSIC; RADAR; STANDARDS, NATIONAL BUREAU OF; TELEVISION.) (I. V.)

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Radioactivity

See ATOMIC BOMB; CHEMISTRY; PHYSICS.

Radio Detection

See RADAR.

Radiolocation

See RADAR.

Radiology

Radiology made significant progress in its own realm during the decade 1937-46 and contributed not a little to developments in other branches of science. Activities in radiology may be divided into several categories. Originally appearing with Wilhelm Roentgen's discovery of X-rays as a branch of physics, it continued as an important subdivision of the physical group of sciences through development in the many phases of radioactivity. It also became instrumental in adding knowledge to certain phases of chemistry because of the ability of short wave radiations to indicate the ultimate structure of matter; to biology in shedding light upon cell structure, mechanics and genetics; to the basic medical sciences by revelations in anatomy, physiology and pathology and in industry and engineering with numerous applications to their problems. (See X-RAY.)

Though the auxiliary applications of radiology to the various sciences grew in importance, the greatest field of application during the decade was still to medicine in the diagnosis and treatment of disease. In these fields, many advances were made in improvements of techniques, refinements in diagnostic methods, development of greater accuracy in diagnosis and extension of the field of usefulness. While many of these advances were not sufficiently new to justify reporting here, the total represented a significant increase in the utility of radiology to the practice of medicine. The diversion of energy into channels required by World War II reduced the amount of original research in the last half of the decade except in those portions related to atomic fission. Early in the postwar period, evidence of renewed activity in fundamental new research appeared from many quarters.

Radioactive Isotopes.—Probably the most important developments were in connection with the use of radioactive isotopes. These modified elements, having the same chemical properties as the normal elements, may be injected in small quantities for tracer studies or in larger amounts for their therapeutic effect. The absorption, distribution and excretion of the isotopes may be studied by observing the radiations which they give off as they disintegrate. Featuring prominently in this type of research during the decade were phosphorus, iron, iodine, strontium and sodium.

Radioactive phosphorus was shown to localize in the bones, liver and spleen of normal people and in the white blood cells and bone marrow of leukaemic patients and in the characteristic cells of those with lymphosarcoma. In addition to knowledge of the pathological physiology of these diseases, larger doses of radiophosphorus, injected intravenously, were used successfully in their treatment. Radioactive iron was used in studies of the blood in normal individuals and in anaemia and with radiosodium in studies of the mechanism of shock and on the fate of cells after transfusion. Radioactive iodine contributed considerable knowledge to the physiology of the thyroid gland and goitre and showed some possibilities of use in the treatment of diseases of this gland. Radioactive strontium was found to localize in the growing portions of bones, suggesting that this substance might eventually prove useful in the treatment of bone tumours. Much of this work was interrupted by World War II, as materials and the energies of atomic physicists were devoted to military objectives. Numerous additional isotopes were made available, though in limited quantities, by the process of atomic fission, and would be available for future research.

Basic Science.—Of fundamental importance to radiology was the invention of the betatron. Though not yet applied to medicine in 1946, the very high voltages possible indicated that future therapeutic methods would be strongly influenced by this instrument. Measurements on phantoms indicated that the depth dose could be controlled in a more effective manner because the dose is a function of the voltage. As the voltage was increased the plane of maximum dosage became deeper. At 20,000,000 volts the maximum effect was about ten centimetres below the surface.

Considerable interest attached to studies in the field of biological chemistry and the structure of proteins by Roentgen-ray diffraction. Investigations were made in egg albumen, haemoglobin, nerve tissue, on the function of enzymes and the effect of formaldehyde on proteins.

Studies by means of the Roentgen-rays contributed materially to certain phases of anatomy and physiology, giv-

ing information obtainable in no other way. Previously, many anatomical studies had to be made only on the cadaver and physiological studies on animals or isolated tissues. By means of Roentgen-ray methods large numbers of living, healthy subjects of different ages could be studied. This type of observation was particularly fruitful in surveying the time of appearance and rate of development of ossification centres and in studies in the gross anatomy and physiology of the gastrointestinal tracts of infants.

Contributions were made to both anatomical and physiological fields with the development of angiography—study and description of the blood vessels. Successful angiography was dependent upon two new developments—the discovery of nontoxic opaque substances which are miscible with the blood stream, and the development of cine-fluorography. Two classes of opaque materials may be used: thorium dioxide sols or organic iodine bearing compounds such as are used in intravenous pyelography. Cine-fluorography made rapid strides with the advent of brighter fluorescent screens, better lenses and faster photographic emulsions, so that excellent moving pictures of the fluorescent image may be made. The opaque material is injected into the appropriate artery or vein and rapid serial exposures made immediately thereafter. With these improvements it became possible to demonstrate the circulation in the heart and the great vessels in both human and animal subjects. Especially interesting studies appeared on the foetal circulation in sheep and the changes occurring at birth.

Medical Diagnosis.—Angiography was successfully used also in the diagnosis of certain types of congenital heart disease. Injection of opaque material into the carotid arteries enabled excellent visualization of the intracranial circulation, assisting in the diagnosis of aneurysms and anomalies and in the localization of tumours as well as the detection of other diseases. In a similar manner the abdominal vessels were visualized, revealing various types of arterial disease not previously demonstrable.

Considerable improvement and extension of utility of venography by opaque media were made. This proved particularly useful in determining the condition of the venous circulation in varicose veins and thrombophlebitis.

The investigation of diseases of the small intestines attracted considerable attention. In certain states of vitamin deficiency, degenerative changes occur in the nerve plexuses resulting in dysfunction of the musculature giving a characteristic appearance in the roentgenograms.

The field of usefulness of radiology in obstetrics was extended, and the utilization of studies by X-ray became more generally accepted. Most of the techniques of pelvimetry had long been known, but there were many improvements in these techniques. Better methods for the localization of the placenta were developed. The Roentgen rays became generally useful in the diagnosis of renal complications of pregnancy by the extended use of intravenous pyelography.

Body section roentgenography introduced about the beginning of the decade underwent a great deal of development and became generally adopted. This technique of examination appeared under many synonyms: laminography, planigraphy, stratigraphy and tomography. The method consists in moving an X-ray tube in one direction while the film is moved in the opposite, about a fixed axis. The level of the axis may be placed at any plane in the body. The shadows of all objects in the plane of the axis

will be sharp while those above and below will be blurred. This type of examination proved of great value in many fields, particularly in the radiography of the temporomandibular joint, the nasal accessory sinuses, the larynx, the sternum and in many diseases of the lungs.

Photofluorography, the indirect Roentgen examination by photographing the image on a fluorescent screen, was developed and brought to a high state of refinement. This type of apparatus became particularly useful in examining large numbers of patients in a short time, such as surveys for tuberculosis and the examination of recruits for the armed forces. The principle of all was essentially the same; the image on a bright fluorescent screen is photographed with fast lens on a fast photographic emulsion. Film sizes from 35 mm. up to 4 x 5 in. are used. The resulting film is read by projection or magnification. By this method it is possible to examine as many as three patients a minute. It was felt at the end of the decade that this type of examination was not yet suitable for accurate diagnosis, but was adequate and efficient for screening the normal from the diseased individuals.

Radiation Therapy.—In the realm of X-ray and radium therapy, significant advances were made in many directions during the decade 1937–46. Of basic importance in the treatment of cancer were numerous studies upon the effects of various types of radiation on cells as well as the effects of intensity, dosage and fractionation. While all these results had not yet been applied to practical irradiation by the end of the decade, certain fundamental facts were emerging: that cells are most sensitive in the premitotic phase, that there is a critical range of intensity below and above which radiation becomes less effective, and that most effective fractionation probably can be accomplished by co-ordinating it with the cell types of the tumour, possibly with change in the rate of fractionation as treatment progresses and the characteristics of the cells become altered as a result of the irradiation.

One characteristic of development in radiation therapy of the period was that of supervoltage machines, up to about 1,000,000 volts. Supervoltages gave promise of better results because of the better depth dose and reduced superficial reactions. Many reports from various sources appeared on results of treatment showing improvement in the percentages of five-year cures and decreased undesirable reactions. While the results were encouraging, they did not equal the hopes aroused by the first enthusiasm for supervoltage treatment.

Irradiation had been known for many years to be of benefit in certain acute infections. During the decade this aspect of therapy spread in scope and became more generally accepted. Although the use of radiation in these conditions was purely empirical, it was shown to be useful in pneumonia, sinusitis, postoperative parotitis, acute peritonitis, gas gangrene and numerous localized infections.

Interesting reports appeared of changes in bone following deep X-ray treatment. Fractures of the femur following treatment to lesions within the pelvis, fractures of the ribs after irradiation of lesions of the breast and aseptic necrosis of the skull after treatment of intracranial lesions were reported, some appearing as long as 15 years after the original treatment. Successful treatment of radiation dermatitis with alpha ray ointment was developed.

Apparatus.—A very useful piece of new apparatus for roentgenology was invented—the Morgan exposure meter. This is a device using two photoelectric tubes which automatically time the exposure. Accurate duplication of exposure is possible regardless of voltage within reasonable limits. The meter may be adjusted to give any de-

sired quality of film. This device proved of inestimable value in mass surveys. (See also CANCER.)

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(S. J. Hy.)

Radiotherapy

See RADIOLOGY.

Radium

While small amounts of radium are associated with the vanadium and uranium ores of the western U.S., recovery of the radium received little attention during the years of World War II. The last output officially reported during the decade 1937-46 was 2.6 grams in 1942. Imports of radium salts into the U.S. were as follows:

	Grams	Value		Grams	Value
1937	15.29	\$ 377,659	1942	23,043	\$ 377,326
1938	38.75	787,025	1943	90,755	1,366,538
1939	78.631	1,953,820	1944	101,290	1,374,933
1940	30.311	748,097	1945	67,342	991,979
1941	4.412	110,202			

Demands for war uses, especially for industrial radiography and in luminous paints, overshadowed the normal medical uses during the decade. (G. A. Ro.)

Raeder, Erich

Raeder (1876?-), German naval officer, was born in Wandsbek, Germany. He entered the German navy in 1894, rising to the rank of commander in 1911 and was made chief of staff to Adm. Franz Ritter von Hipper in 1912. Raeder participated in several naval engagements in World War I, escaping from the German flagship "Lutzow" before it was sunk in the battle of Jutland in 1916.

After the war, Raeder headed the central department of the reich naval office. In 1922, he was promoted to rear admiral and inspector of naval education; six years later he was promoted to admiral at the head of the naval command. Raeder supported the nazis, and in 1935 was rewarded by Adolf Hitler with the post of commander in

chief of the German navy. In 1939, he was promoted to the rank of grand admiral.

Chief architect of the Germany navy during the peace years, he ordered construction of new vessels in secret violation of the Versailles treaty. He originated the plan for the invasion of Norway in 1940, and directed the navy's plan of unrestricted submarine warfare.

Raeder retired from the navy at his own request, Jan. 30, 1943, and was succeeded by Admiral Karl Doenitz. He was taken prisoner by the Allies after the collapse of Germany in May 1945 and was indicted Aug. 29, 1945, on charges of war crimes. Convicted on Oct. 1, 1946, by the International Military tribunal sitting at Nuernberg, he was sentenced to life imprisonment for having committed crimes against the peace and war crimes.

Railroad Retirement Act

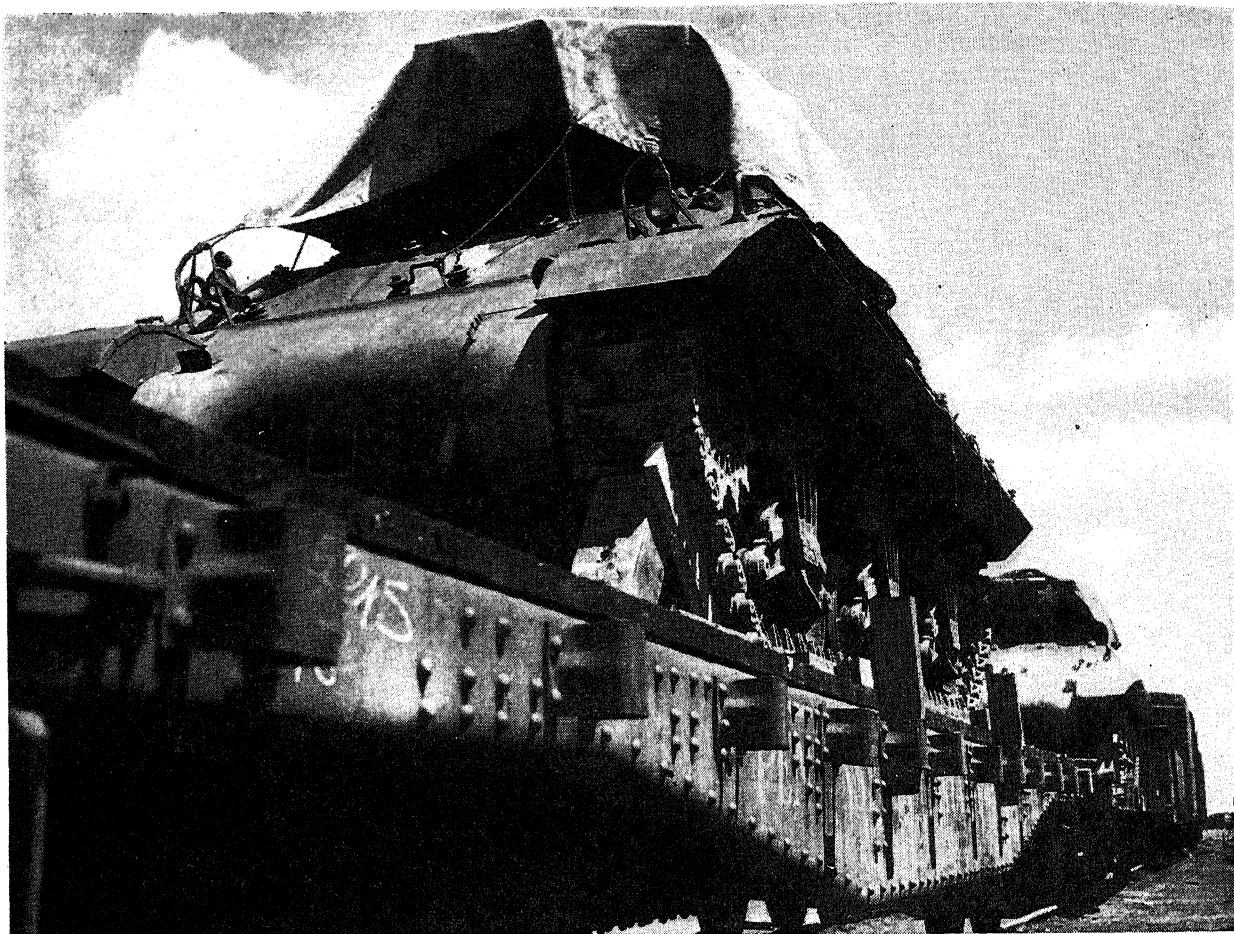
See SOCIAL SECURITY.

Railroads

Throughout the ten eventful years ending in 1946 there were wide variations in the yearly railroad transportation product in ton-miles and passenger-miles, railroad gross revenues and net income, number of employees and their compensation and the statistical units which reflect the degree of operating efficiency. During 1937, the first year of the decade, there were indications that the adverse forces of the depression which began late in 1929 had been spent, and that the United States was on the road toward an early recovery from the worst economic setback in its history. The partial recovery, however, was retarded by the "recession" of 1938. Conditions became better in 1939, but uncertainty and confusion followed the beginning of World War II when Germany overran Poland and the armed conflict began among Germany and the allied forces of England and France. Throughout 1940 the national economy of the United States was disturbed by the war in Europe. In 1941 the program of national defense and the inauguration of material assistance in lend-lease to the nations aligned against Germany virtually brought the United States into the war. The Selective Service act had been passed, the United States began to build up an army of defense, and the transportation activities were on a large scale. Then came the Japanese attack on Pearl Harbor and the declaration of war in Dec. 1941. From then until V-J day in Aug. 1945, the U.S. railroads, dedicated primarily during the war years to military ends, met the unprecedented transportation demands with adequate service.

Following the capitulation of Germany in May 1945, the transportation pattern changed materially. In the expectation that the war with Japan would continue many months, plans were made to deploy the armed forces from Germany to the Pacific theatre, and movement of troops, equipment and supplies back to the United States and then to the Pacific was under way when Japan surrendered in August. Then came the reverse movement from the Pacific ports to the separation centres throughout the country for demobilization. The overload on the railroads continued well into 1946.

Changes in U.S. Track Mileage.—During the decade 1937-46, the mileage of railroads in the United States had a steady but slight downward trend. The miles of newly constructed lines were less than the miles abandoned because of unprofitable operations. The process of abandonment was stimulated by the urgent need of scrap steel, and



Armoured tanks rolling out of the Proviso, Ill., yards of the Chicago and North Western railroad for shipment overseas during World War II

that need had influence upon the Interstate Commerce commission, without whose permission the unprofitable segments in a railroad system could not be abandoned. The line mileage of Class I railroads (those having annual operating revenues of \$1,000,000 or more—constituting about 95% of total mileage and earning about 97% of total operating revenues) dropped from 223,962 in 1937 to 215,403 on Jan. 1, 1945.

These data are for miles of line and do not reflect the miles of track on the average mile of line. On Jan. 1, 1937, there were 370,992 mi. of Class I tracks, including the first running track, multiple running tracks and sidings and yards. This track mileage had been reduced to 355,880 by Jan. 1, 1945.

The inauguration of lightweight streamlined passenger trains in the early '30s, and the rapid increase in the number of such trains run at relatively high speed, were accompanied by programs of line straightening, curve reduction, improvements and extensions in signalling, deeper ballast under the track and higher standards of maintenance of track, roadway and structures. In some cases the physical betterments included reductions in the rates of the grades and relocation of the line. While these improvements were stimulated mainly by the need of ways over which the high-speed passenger trains could be operated safely, they were of benefit also to freight service, in which the average speed of trains was materially increased. Coincident with the betterments on the line, corresponding improvements were made in terminals, notably in freight classification yards. Programs for such work, well under way in 1930, were suspended or curtailed during the depression but were resumed in part during the late '30s and pushed forward vigorously when World War II began in Europe.

Investment of these large additional capital outlays at a time when railroad net earnings were low, and the potential competitive effect of newer forms of transportation was uncertain, called for courage on the part of railroad managers. Their faith in the railroad as the prime mover among the transportation agencies was justified by the commendable performance of railroads during World War II. If the improvements which brought increases in capacity to handle traffic had not been made before the United States entered the war, the unprecedented transportation demands might not have been adequately met.

Locomotives and Cars.—In U.S. locomotives and cars, there were moderate reductions in numbers. The new units added, however, were of greater power and capacity than the old units retired, and the proportion of the total in unserviceable condition was less. There was, therefore, little change in the aggregate power and capacity available for service. The number of locomotives on Class I railroads on Jan. 1, 1937, was 44,347. The comparable number on July 31, 1946, was 42,520. The loss of 4% in number was offset by a gain of 10% in average tractive capacity per unit and a reduction in the per cent unserviceable from 22 to 15.

An important development during the decade was the large increase in the number of diesel-electric locomotives. First employed in the '20s for switching service, the diesel was next used generally on streamlined passenger trains. Its efficiency and suitability for heavy passenger trains was demonstrated, and it was rapidly displacing the steam locomotive on lines with heavy traffic. Its use in freight

service was also becoming general. During the decade, the number of diesels ordered by railroads of the United States was nearly three times as great as the number of steam locomotives ordered. In 1945, for example, the total orders for 856 locomotives comprised 702 diesels, 148 steam and 6 all-electric.

Experiments were made in other types of locomotive and in new types of fuel. The steam turbine locomotive showed promise, and the use of powdered coal as fuel gave good results.

There was a striking development in lightweight streamlined passenger cars for name trains operated at high speed. The serious decline in U.S. rail passenger traffic in the '20s and early '30s had held back orders for new cars. As the old were retired they were not replaced. The number of passenger train cars on railroads of all classes in 1921 was 56,950. As of Jan. 1, 1937, it was 40,949. On Jan. 1, 1945, it was 38,217. The railroads, in the late '30s, undertook extensive measures to regain some of the passenger traffic lost to the automobile and the bus and to meet the new challenge of the aeroplane by modernizing their passenger train equipment, increasing train speed and adding to the comfort of passengers.

The number of freight cars owned by U.S. railroads of all classes showed little change between 1937 and 1946. At the beginning of the decade it was 1,766,428, and on Jan. 1, 1945, it was 1,797,012. These figures do not include the privately owned freight cars of the packers, fruit growers associations, oil companies and others which numbered 290,668 in 1937 and 270,936 on Jan. 1, 1945. The principal development in freight cars was an increase in the average tonnage capacity, a decrease in its tare weight by the use of metal alloys and plywood in construction, improved air brakes and high-speed trucks. The average weight capacity in 1937 was 49.2 tons. In 1946 it was about 51 tons.

Financial Organization.—The findings of the Interstate Commerce commission in its reports on physical valuation of railroads (under the Valuation act of 1913) indicated clearly that the cost of reproducing the properties, minus an allowance for physical depreciation, was greater than the capitalization. From the viewpoint of actual cash investment in roadway, structures, real estate and equipment, U.S. railroads collectively were not overcapitalized, but in many cases the capitalization was greater than justified by net earnings.

One weakness in the typical railroad financial structure was that the amount of borrowed money was substantially in excess of the amount of money risked by the owners. Borrowed money, in large part, was secured by bonds which were a mortgage on the property and a first lien on net earnings. If the interest was not paid currently, or if the principal was not paid when the bonds matured, the railroad was likely to go into receivership or trusteeship, and the control of the property would pass from the owners (the stockholders) to the courts which acted for the protection of the bondholders and other creditors. This weakness in the capital structure led to serious trouble in the early years of the depression, when net earnings were insufficient to service the debt. In 1934 there were 80 railroads in the hands of receivers or trustees. Their mileage was 42,168, or 17% of the total. On Dec. 31, 1939, the number of bankrupt roads rose to 108, with a mileage of 77,013, almost one-third of the total mileage. After 1939 the reorganization of several railroads was completed, and the properties emerged with a much sounder capital structure.

On Dec. 31, 1945, the number of railroads still in process

of reorganization and in the hands of the courts was 75, with 41,154 mi. of line.

As a result of reorganization, under court proceedings, of 33 railroads after 1939, and the successful efforts of other railroads to revamp their capital structure without court proceedings, the balance sheet of the railroads as a whole in 1946 showed a material improvement over that of 1937. Total capitalization had been reduced, notwithstanding substantial additional investments in betterments, and, even more important, the ratio of fixed interest-bearing debt to total securities was cut down. A substantial part of the fixed interest bonds was converted into income bonds or debentures on which the interest charges did not have to be paid currently if they were not earned. These interest charges, therefore, were contingent on earnings, and failure to pay did not necessarily lead to bankruptcy. Table I shows the nature and extent of the changes between Dec. 31, 1937, and 1944 of railroads as a whole (excluding switching and terminal companies).

Table I.—U.S. Railroad Capitalization
(in millions)

Item	1937	Per cent of total	1944	Per cent of total
Common stock	\$7,790	35.9	7,464	38.5
Preferred stock	2,023	9.3	1,984	10.2
Total capital stock	9,813	45.2	9,448	48.7
Mortgage bonds	9,331	43.0	8,393	43.3
Collateral trust bonds	812	3.7	394	2.0
Income bonds and debentures	313	1.4	528	2.7
Miscellaneous obligations	871	4.0	39	0.2
Equipment trust notes	555	2.6	600	3.1
Total funded debt	11,882	54.8	9,954	51.3
Total capitalization	21,695	100.0	19,403	100.0

The figures in Table I require qualification. They represent the total amount of securities issued and outstanding. Inasmuch, however, as about one-fifth of the securities were held by the issuing railroads or by other railroads which had used them in part as the underlying security for collateral trust bonds, the net capitalization in the hands of the public was considerably smaller. The net capitalization is shown in Table II.

Table II.—U.S. Railroad Securities in the Hands of Nonrailroad Holders
(in millions)

Item	1937	Per cent of total	1944	Per cent of total
Capital stock	\$7,069	39	6,964	43
Funded debt	11,250	61	9,312	57
Total net capitalization	18,319	100	16,276	100

Several railroads used a substantial part of their war years net earnings to purchase their own securities. Others were successful during 1943-45 in refunding maturing issues of bonds in smaller amounts and at lower interest rates. As a consequence of that process, and of the reorganizations in bankruptcy proceedings, the fixed interest charges on funded debt of Class I railroads were reduced from \$441,000,000 in 1937 to \$382,000,000 in 1945. These reductions in capitalization and interest charges were more noteworthy when consideration was given to the fact that the net additions and betterments to the properties during those eight years added more than a \$1,033,333,333 to the railroad investment account of Class I railroads.

Volume of U.S. Railroad Traffic.—In 1937 the volume of rail traffic was markedly subnormal as a result of the depression. The volume in 1938 was even lower. An improvement was apparent in 1939. Then came the beginning of World War II with its stimulating effect on industrial output and transportation demands. Each year from 1940 to 1945 there were continued increases in the numbers of tons and passengers moved by U.S. railroads. Further

increases were arrested by the surrender of Germany in May 1945, and the capitulation of Japan three months later. The traffic volume of 1945 was somewhat less than in 1944. In 1946 the ton-miles were about 15% less and the passenger-miles about 29% less than in 1945.

Table III shows the traffic volume and the length of the haul in selected years of the decade under review.

Item	1937	1940	1942	1943	1944	1945
Revenue tons originated (millions) . . .	1,016	1,009	1,421	1,481	1,491	1,425
Revenue ton miles (billions)	361	373	638	727	737	681
Revenue passengers (millions)	497	453	667	882	910	894
Revenue passenger miles (billions) . . .	25	24	54	88	96	92
Miles per originated ton	337	351	428	469	473	477
Miles per passenger per R.R.						
Suburban	17	17	18	17	17	17
Others	82	88	123	144	152	151
All passengers	50	52	80	100	105	103

The movement of military personnel and freight during World War II had a marked effect on the average distance per passenger (per railroad) and the average miles per originated ton (all railroads considered as one system). The average miles per passenger, exclusive of commutation (suburban) service jumped from 82 in 1937 to 152 in 1944. The average haul per originated ton rose from 337 in 1937 to 477 in 1945. In terms of volume, the ton-miles increased more than two-fold and the passenger-miles in 1944 were nearly four times the volume of 1937.

By far the greater part of the gain in railroad traffic in 1942-45 was in military supplies and equipment and in movement of military personnel, both under orders and while on furlough. Coupled with these movements on passenger trains was a large volume of civilian travel to and from the training camps and other military establishments. During the years of World War II, about 90% of the military freight and about 98% of organized groups of military personnel moved by rail. The remainder was moved by highway, inland waterway and air.

U.S. Railroad Record in World War II.—In contrast to U.S. railroad performance during the first ten months of World War I, when serious congestion and inadequate service led President Wilson to take over the railroads for governmental operation, the railroads throughout all of the four years of World War II, under private ownership, satisfactorily met all of the heavy military transportation demands without congestion, car shortage or unreasonable delay. And this was done with the minimum of sacrifice on the part of the civilian population. Railroad performance brought high praise from the military heads and other governmental officials.

In tons hauled 1 mile, the best quantitative measure of freight service, the production in 1944 was more than twice that of 1937. In passengers carried 1 mile, the 1944 production was nearly 4 times that of 1937. Or if the records of World War II be compared with those of World War I, the figures would show that in 1944 the ton-miles were 124% more than in 1918 and the passenger-miles 82% more. Furthermore, the larger volume in 1944 was handled with 32% less locomotives, 24% fewer freight cars, 30% less passenger train cars and 23% fewer employees than in 1918.

This achievement was the result of intelligent and forward-looking planning in prewar days and distinct progress in managerial technique. The achievement, however, would not have

been possible without the large measure of co-operation from shippers, government agencies and the travelling public. From shippers the co-operation took the form of minimizing freight car needs by reducing the time taken by loading and unloading and by loading more tons into each car. Through the Regional Shippers Advisory boards there was free and helpful interchange of suggestions and advance notice of car requirements. Complete and cordial liaison with the quartermaster general's organization and the bureau of supplies and accounts of the navy brought about an effective and continuous understanding of military transportation needs. Continuing contacts with the Office of Defense Transportation and the Interstate Commerce commission brought help from those bodies when help was needed, and on the part of the public there was ready acceptance of curtailment in service and little complaint about crowded and late trains.

From the experience in World War I, the railroads learned to do better and avoided their earlier mistakes. Through an organization created in the early '20s, in which the army and the navy were represented, plans were made and periodically reviewed so that in the event of another war the military needs would be known and the railroads would be prepared to meet them. The smoothness with which the early transportation demands were met in the hectic days following the attack on Pearl Harbor was proof of the thoroughness and efficacy of earlier planning.

Revenues, Expenses and Net Earnings.—Contrary to a widely held opinion among the general public, the U.S. railroads as a whole did not make large net profits during World War II. It is true that gross earnings were higher than ever before, but the large increases in revenues were accompanied by corresponding inflation in the cost of wages and materials, and taxes were nearly six times as great in 1944 as in 1937. During the four years (1942-45) when the United States was at war with Germany and Japan, the gross operating revenues of Class I railroads were \$8,715,000,000 per year. The corresponding figure for the four predepression years (1926-29) was \$6,228,000,000. Yet after the payment of the higher operating expenses and taxes and the somewhat lower fixed charges, the yearly net income was \$722,000,000. The corresponding figure for 1926-29 was \$791,000,000. The net income during World War II, therefore, was 9% less than in the predepression years.

Table IV contains a condensed income account of Class I railroads in 1929, a prosperous predepression year; 1937, in which there was an upturn in business after six years of depression; 1940, a prewar year in which business conditions were fairly normal; and the four war years, 1942-45.

It will be noted that the stockholders did not earn as much in net income in the war years as they did in 1929. The dividends declared in 1926-29 averaged \$433,000,000 per year on an investment of about \$24,000,000,000. During the 9 years of depression they were \$185,000,000 per year (declared largely from surplus) on an investment of about \$26,000,000,000. The dividends in the war period were about \$220 annually. A substantial part of the net income of the war years was used by management for capital additions and betterments to property and to pur-

Table IV.—Condensed Income Account, Class I U.S. Railroads
(in millions)

Item	1929	1937	1940	1942	1943	1944	1945
Operating revenues	\$6,280	4,166	4,297	7,466	9,055	9,437	8,902
Operating expenses	4,506	3,119	3,089	4,601	5,657	6,282	7,052
Taxes	397	326	396	1,199	1,849	1,846	825
Net operating income	1,252	590	682	1,485	1,360	1,106	850
Income available for charges	1,589	740	824	1,618	1,320	1,276	1,016
Fixed and contingent charges	693	642	635	716	647	609	569
Net income	897	98	189	902	873	667	447

chase their own securities in the open market.

Quality of Service.—Throughout the depression, when railroad traffic, especially in the passenger department, was critically low and a large part of capacity was not utilized, the railroads did well in maintaining the quality and adequacy of service. Some regular trains were withdrawn, and the abandonment of unprofitable branch lines, which were sapping the strength of the main lines, was stimulated. As a whole, however, an earnest effort was made to improve rail service and meet the intensified competition of carriers by highway, water and air. Freight service was speeded up, and additions were made to the fleet of scheduled fast freight trains.

The most notable development was the inauguration of lightweight streamlined trains operated at high speed. In 1935, there were 14 of these trains in operation. To these, 22 were added in 1936, and there were 46 by the close of 1939.

In 1946, the number was about 70, with others under construction.

In addition to the name trains, with lightweight equipment hauled by diesel locomotives, there were notable improvements in the design of the cars used in conventional trains with steam locomotives, and the speed of those trains was stepped up. During World War II, the railroads were unable to obtain priorities for the construction of urgently needed additional equipment. When the ban was lifted a few months after V-J day, orders for large numbers of cars of modern design were placed and some of them were delivered in 1946. Air conditioning became standard on all new cars for through trains; toilet, dressing and lounge facilities were made more ample; more attention was given to design, colours and decorations; and the lighting arrangements were materially improved. In sleeping cars the

provision of separate rooms, displacing the conventional berths, met with definite public approval.

An interesting innovation on one road was a de luxe passenger car with a second story covered by a dome-shaped roof made of glass.

Freight and Passenger Rates.—The critical financial condition of the U.S. railroads in 1937 led them to ask the Interstate Commerce commission for permission to increase freight rates. The request was granted in small part. It was equivalent to an advance of 2%. Considering the increase as inadequate, the railroads petitioned the commission to reopen the case, and after further hearings an additional advance of about 5% was approved.

The railroads in eastern territory, late in 1937, sought the commission's approval of an increase in the coach passenger fare from 2 cents to 2.5 cents per mile. This the commission denied in April 1938, but on rehearing and further consideration the commission reversed itself and permitted the 2.5 cent rate to go into effect for 18 months. About the same time the commission permitted an increase of 5% in charges for space in sleeping and parlour cars. The Pullman company had asked for 10%. In another case, decided in Feb. 1939, the commission authorized a small increase in the rates charged by the Railway Express agency.

When the 18 months time limit on the increase in coach fares expired in Jan. 1940, the commission extended the period 3 months, but after further hearings ordered that the 2-cent rate be restored from March 25, 1940. In Feb. 1942 the railroads were permitted to increase the rate 10% to 2.2 cents. That rate was still in effect at the end of 1946.

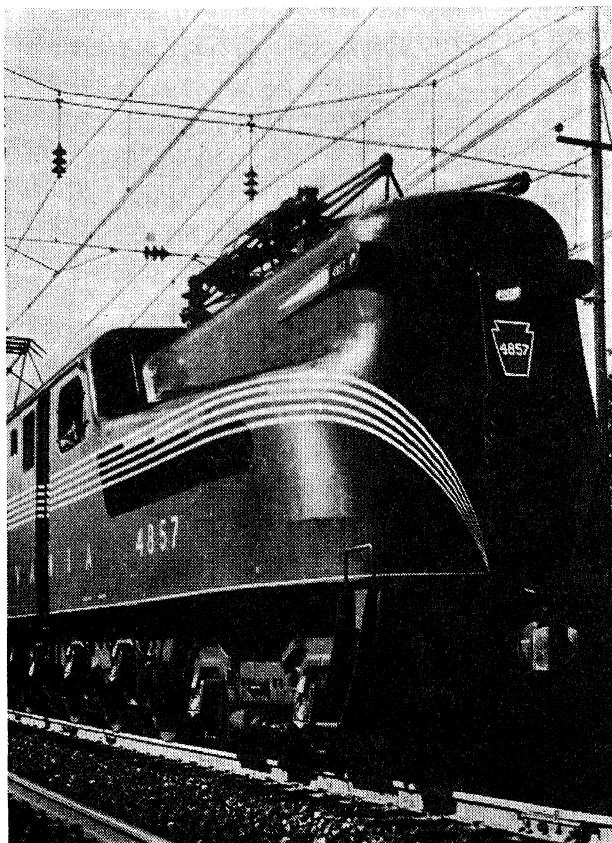
The first of the commission's decisions in the Southern Governors' Rate Case became effective on March 1, 1940. The south had contended that it had been retarded economically by freight rate barriers. The decision required adjustments in rates on a limited number of manufactured and processed articles moving between the north and south. The majority of the commission (it was a 5 to 4 decision—2 members not participating) found that higher rates from south to north placed southern producers at an undue disadvantage.

The decision, however, did not end the case. The commission later began a comprehensive investigation of the entire class rate scales of north, south and west and, as a so-called "interim measure," ordered the railroads, effective Nov. 30, 1945, to increase the class rates in the north 10% and to reduce class rates in other territories (except west of the Rockies) by the same percentage. The commission further required the railroads, as soon as practicable, to bring about uniformity in the classification which designated the classes into which each commodity fell. The development of the classifications in the several rate-making regions had gone on independently in each region, and there was conspicuous lack of uniformity.

Acting on the petition of the governors of nine north-eastern states, the federal district court in northern New York granted an interlocutory injunction in Dec. 1945, enjoining the enforcement of the commission's order requiring a 10% increase in class rates in the north and a 10% decrease in the south and parts of the west. Thereupon the commission ordered an indefinite postponement of the rate changes until the legal questions were cleared.

In April 1943 the commission, because of the improvement in rail earnings, ordered the railroads to suspend certain of the freight rate increases which had been approved

Electric locomotive of the GG-1 type for the "Broadway Limited," running between New York city and Chicago



in March 1942. The suspension was to continue until June 30, 1944. Later the suspension was further extended, and the case was merged with the broader issue when the railroads, in May 1946, asked for a general increase of 25% in freight rates. The substantial increases in labour and material costs had had a serious effect on net income beginning in the second half of 1945. The hearings began on May 6, 1946, and on June 29, as an emergency measure to afford partial and temporary relief while further consideration to the subject would be given, the commission authorized rate advances of approximately 6.5%. The extent of the increases varied between regions according to the commission's views concerning relative needs. While the temporary and inadequate relief was welcomed by the railroads, they pressed for prompt action on their plea for the full 25% increase. (During the first half of 1946 the net railway operating income was insufficient to cover all fixed charges.) The commission promised to expedite the proceedings; further hearings were held, but at the end of 1946 the matter was still under consideration.

The average revenue per ton-mile and per passenger-mile are measures of the unit prices paid by the public for transportation service. These units were affected directly by the general scale of rates but they were influenced also by changes in the proportions which the various commodities and types of passengers bore to the totals and by the length of the haul.

One significant change in the policy of the Interstate Commerce commission may be mentioned. At many times during its 60 years of service, the commission had considered requests to approve rates which for commodities in trainload lots would be lower than the rate for a single carload. All such proposals had been disapproved, principally because the lower trainload rate might give big business an undue advantage and might work to the detriment of the small shipper. This policy was reversed in Dec. 1939, when the commission approved a proposal of southern railroads to grant preferential rates on trainload lots of blackstrap molasses from New Orleans to points in Illinois.

Operating Efficiency of Class I Railroads.—During the decade, U.S. railroads made notable gains in the efficiency of operation, especially during World War II. Of special interest was the higher utilization of the potential capacity of freight locomotives and freight cars at a time when there was ever-present danger that a freight car shortage might develop. An increase of 1 mile in the average daily miles-per-freight-car was equivalent to adding approximately 100,000 cars to the available supply. A part of the gain in efficiency was due to the increased volume of traffic which permitted more complete utilization of capacity. Part was attributable to additional capital outlays for

improvements in plant and equipment. Still another part was due to advances in the technique of management. And finally a substantial part was due to assistance from outside—co-operation from the Office of Defense Transportation, the Shippers Advisory boards and the individual shippers.

Approximately three-quarters of U.S. railroad gross revenues came from the movement of freight. The efficiency of freight train and freight car performance, therefore, was highly important. The economic objective was to get the maximum number of ton-miles (producing revenues) with the minimum number of train-miles (representing costs). In the case of freight cars the objective was to produce the maximum in ton-miles with the minimum in car-days.

In the predepression year 1929 with the heaviest volume of traffic up to that time, the average freight train had an average net load of 804 tons. During the depression years, with subnormal traffic, the net trainload dropped as low as 663. In 1937 it was 796. In 1941 it was increased to 915 and during the years of World War II it increased steadily, reaching an all-time high of 1,139 tons in 1944. Because of a slight decline in traffic, it dropped to 1,129 in 1945 and in the first 7 months of 1946 it was 1,055.

While the trainload was of high importance from the viewpoint of operating efficiency, the average speed of the train between terminals was also important. Some costs were proportional with train-miles but the greater part ran with train-hours. In 1929 the average speed of freight trains, terminal-to-terminal including road delays, was 13.2 m.p.h. In 1937 it was 16.1 m.p.h. The very heavy volume of traffic during World War II caused more road delays in meeting and passing other trains, and the average speed dropped to 15.7 m.p.h. in 1944 and 1945. During the first 7 months of 1946, with slightly less traffic, it rose to 16.1 m.p.h.

The resultant of these two factors—the trainload and the train-speed—is net ton-miles per train-hour, the tons moved hourly one mile by the average freight train. In 1929 the figure was 10,580. In 1937 it was 12,695. The comparable figure in 1944 was 17,621 and in the first 7 months of 1946 it was 16,806. These figures indicate that the hourly production of the average freight train in 1944 was 66% better than in 1929 and 39% better than in 1937.

There is nothing romantic about a freight car, but it is the moneymaker for the railroads. Much depends upon its daily productivity in ton-miles. It was the most vulnerable spot in railroad armour in the successful struggle to meet the intensive freight transportation demands while World War II was in progress.

The freight car is in motion in trains an astonishingly small part of its time. By far the greater part of its drab life is spent in movements to and from outlying yards and freight station or on loading and unloading tracks, in classification yards, at junction points between railroads, in

shops for repairs, and at freight stations or on industrial sidings. During World War I, the average freight car moved about 24 mi. per day.

From lessons learned in the war experience in 1917-18, railroad managers were made conscious of some of the weak spots, and in planning for World War II they set about to reduce delays for which

Table V.—Average Revenue per Ton-Mile and per Passenger-Mile
Class I railroads

Item	1937	1940	1942	1943	1944	1945	1st 6 mos. 1946
Revenue per ton-mile (cents) . . . . .	.935	.945	.932	.933	.949	.960	.965
Revenue per passenger-mile							
Suburban (cents)	1.011	1.014	1.062	1.074	1.066	1.080	1.080
Nonsuburban "	1.951	1.904	1.999	1.933	1.921	1.920	1.990
All passengers "	1.795	1.754	1.916	1.882	1.874	1.870	1.920

Table VI.—Freight Car Performance, Class I U.S. Railroads

Item	1929	1937	1940	1942	1943	1944	1945	First 7 mos. of 1946
Car-miles per serviceable freight car-day	34.4	36.6	38.9	48.8	51.0	51.9	48.1	42.8
Tons per loaded car-mile	26.9	27.1	27.6	31.8	33.3	32.7	32.2	30.9
Per cent loaded of total car-miles	62.8	63.0	61.8	62.8	64.2	65.8	67.0	66.4
Ton-miles per serviceable freight car day	582	625	664	975	1,092	1,114	1,005	841

railroads were responsible and to enlist the co-operation of shippers and receivers of freight to cut down the detention for which they were responsible. The objectives were to cut down the idle hours in yards, terminals, freight houses and shops, to get a heavier carload, and to increase the per cent loaded of total car-miles. The results for 1929 and in selected years of the decade under review are shown in Table VI.

The most striking fact in the foregoing statistics is that ton-mile productivity of the average freight car in 1944, when freight car utilization was vital, was nearly double that of 1937.

Labour Relations.—The relations between management and the railroad labour unions during the decade 1937-46 were strained on several occasions when disputes grew out of demands for wage increases and changes in working rules. Two of these disputes led to temporary seizure of the railroads for government operation, and in one of them there was a nationwide strike which paralyzed railroad service for two days.

In the wage controversies, management usually dealt collectively with two groups of unions. The first, known as the operating group, was made up of the train service brotherhoods and yard switchmen, five unions in all. They numbered about 250,000 men. The second, known as the nonoperating group, numbering about 800,000 employees, was comprised mainly of the shop crafts, maintenance-of-way employees, stationmen, clerks and others affiliated with 15 separate unions. Management thus had to deal with 20 unions in 2 loosely-knit groups.

Early in 1937 the operating group demanded a wage increase of 20%. Simultaneously the nonoperating group asked for a pay boost of 20 cents per hour. After long drawn out direct negotiations and intervention by the National Mediation board, the differences were settled by mutual agreement, effective Aug. 1, 1937. The operating group received an increase of 5.5 cents per hour and the nonoperating group received 5 cents per hour.

Almost immediately after the higher wages became effective the "recession" of 1937-38 set in and railroad net earnings dropped close to the low level of the earlier depression years. The loss in gross revenues coupled with the higher wage scale created a serious financial situation. Late in April 1938, the railroads attempted to reduce wage rates 15%, but the move was strongly resisted by the unions. Direct negotiations and mediation failed. The railroads asked that the dispute be arbitrated, but the unions refused. When the railroads insisted on carrying through the wage reduction, the employees threatened to strike. Then President Roosevelt appointed an emergency fact-finding board which made a report on Oct. 29, 1938, recommending that the wage reduction should not be made. The railroads thereupon withdrew the notice of the proposed wage cut.

On June 10, 1941, the two groups of unions presented new proposals. The operating group asked for a 30% advance in the basic wage, with a minimum increase of \$1.80 per day. The nonoperating group sought an increase of 30 cents per hour and a minimum hourly wage of 70 cents—equivalent to an increase of from 45% to 50%—and in addition asked for an annual 2-week vacation with pay. Again direct negotiations and mediation were ineffective, and an emergency fact-finding board was appointed. Its report of Nov. 5 recommended an increase of 7.5 cents for the operating group and 9 cents per hour for the nonoperating group with a 1-week vacation with pay for the second group.

The railroads were willing to grant the recommended



Notice posted by a New York stationmaster on May 23, 1946, when members of the Railroad Trainmen and Locomotive Engineers Brotherhoods struck for an 18½ cents per hour wage increase

increases, but they were rejected by the unions and a strike was called to begin Dec. 7. This action led to a series of conferences at the White House. Acting on the suggestion of President Roosevelt, and with the consent of both parties, the fact-finding board members resolved themselves into a mediation board and as such worked out an agreement which gave the employees more than the mediators in their former status as a fact-finding board had recommended. The operating group received 9.5 cents per hour (10.6%) and the nonoperating group received 10 cents per hour (15.6%) and a paid vacation ranging from 6 to 9 days, depending on length of service.

In the fall of 1942 the nonoperating unions asked for further increases. Similar action was taken by the operating brotherhoods in Jan. 1943. The nonoperating unions set as their goal an increase of 20 cents per hour with a minimum increase of 70 cents per hour. The operating unions demanded a 30% increase with a minimum advance of \$3 per day. Following unsuccessful negotiation and mediation, the matter was placed in the hands of an emergency fact-finding board whose report in May 1943, recommended a general wage increase of eight cents per hour. This recommendation was accepted by both unions and railroads but it was disapproved as too high by the director of economic stabilization. An impasse developed and a strike was called. The strike was averted by President Roosevelt's action, under his wartime powers, in seizing the railroads and turning them over to the army for operation. In effect it was a "token" seizure. The management was actually lodged in the hands of a small group of railroad presidents who were temporarily commissioned as colonels and reported nominally to an army general. This step having been taken, negotiations were resumed. The president's suggestion that he act as an arbitrator was accepted by both sides, and his award gave the operating employees an increase of 9 cents per hour and an average of 9.4 cents per hour to the nonoperating employees. In addition, the operating men were given an annual vaca-

tion of one week with pay, a privilege earlier awarded to the other group.

The year 1944 was free from wage controversy, but in mid-1945 a new set of demands was presented by both groups. The operating men asked for an increase of \$2.50 per day and favourable changes in certain rules affecting wages and employment. The nonoperators requested 30 cents per hour. Again negotiations broke down and mediation was ineffective. In this case, however, there was inter-union friction. The engineers and trainmen refused to go along with the other 18 unions. In Jan. 1946, the 18 unions agreed to arbitration, the result of which was an award of an increase of 16 cents per hour and certain rule changes favourable to labour. The award was accepted by the 18 unions but was rejected by the engineers and trainmen. These two unions had not been parties to the arbitration. With the rejection went a notice that a strike would be called.

On March 8, 1946, President Truman appointed an emergency fact-finding board which, after hearings and further study, recommended (April 18) for the engineers and trainmen the same increase and rule changes awarded by the arbitration board to and accepted by the other 18 unions. This the engineers and trainmen rejected and a strike call, after one short postponement, went into effect at 4.00 P.M. on May 23. The dispute had previously gone to the White House, and in the conferences there President Truman had suggested as a compromise that the 16-cent increase be made 18.5 cents per hour, the extra 2.5 cents to be in lieu of rules changes, further consideration of which would be deferred 1 year. This compromise had been accepted by the 18 unions but was unacceptable to the engineers and trainmen. On the day preceding the strike the president, under his emergency powers, had seized the railroads and directed the Office of Defense Transportation to take over the operation, but the fact that the railroads were being operated by the government did not deter the engineers and trainmen from striking. Trains could not be operated without them, and a nationwide stoppage of rail transportation became almost instantly complete.

On the following day President Truman, in a radio broadcast to the nation, severely criticized the actions of Presidents Alvanley Johnson and Alexander Whitney of the engineers' and trainmen's unions and stated that he would recommend to congress that steps be taken to draft the strikers and place railroad operation under the army. On the next day he appeared personally before a joint session of congress and made those recommendations which, with others, would drastically curtail the powers of labour leaders to strike against public interest. Yielding to the force of a strong adverse public opinion and to pressure from other unions, the leaders of the engineers and trainmen capitulated. They agreed to accept the compromise suggested by the president; the strike was called off, railroad operation was resumed after a two-day stoppage and federal operation of railroads was immediately terminated.

The average number of U.S. railroad employees was 1,114,663 in 1937. It dropped to 939,171 in 1938 and thereafter increased steadily year by year until it reached 1,420,266 in 1945. In May 1946, it had dropped to 1,306,814.

The average annual compensation of all railroad employees, including overtime and other allowances in addition to straight time, was \$1,781 in 1937, \$1,913 in 1940, \$2,307 in 1942, \$2,727 in 1944 and \$2,718 in 1945. The average rate per hour for straight time, exclusive of over-

time and other allowances, was 70.1 cents in 1937, 74.2 cents in 1940, 83.5 cents in 1942, 93.0 cents in 1944 and 93.3 cents in 1945. The figures for 1946 were influenced by the wage increases late in May.

Regulatory Laws.—In the field of U.S. railroad legislation, the principal developments during the decade were the passage of the Transportation act of 1940 and the extension of the powers of the Interstate Commerce commission over freight forwarders in 1942.

The outstanding features of the 1940 Transportation act were (1) the declaration of a national transportation policy which would give fair and impartial treatment to all modes of transportation; (2) the inclusion of inland and coastal water carriers among the agencies subject to regulation by the Interstate Commerce commission; (3) the revision of the section dealing with consolidation, with provision for voluntary consolidations initiated by the carriers subject to commission approval; (4) repeal of certain land grant rates (reduced rates to the government by railroads which received land grants); (5) enlargement of commission powers in supervision and control in matters of finance and accounts and (6) the creation of a temporary board of investigation and research to determine the relative fitness and economy of the several modes of transportation, to report on the extent and equity of taxation and to determine the degree of public subsidy extended to each mode.

Other legislation included an act which provided a national system of retirement and pensions for railroad employees on a scale higher than that provided by the Social Security act; a signal inspection act which expanded the powers of the Interstate Commerce commission over the adequacy, design, operation and maintenance of railroad signal systems; the Voluntary Adjustment act of 1938 (Chandler act) which, for a limited period, permitted a railroad in financial distress to effect a financial reorganization by direct negotiation with creditors without recourse to receivership or trusteeship; and the Boren bill, which repealed provisions of the several Land Grant acts requiring railroads receiving land grants to carry government freight and personnel at reduced rates.

Anti-Trust Proceedings.—The U.S. department of justice, in Aug. 1944, instituted proceedings against the Association of American Railroads, the Western Association of Railway Executives, certain western railroads and several individuals, including railroad officers and bankers, alleging violation of the Sherman Anti-Trust act in collusion in rate-making, retarding the development of competing forms of transportation and blocking the introduction of new equipment and technical improvements.

The principal objective of the suit was to outlaw the regional rate-making associations of railroad officers, associations which for many years had functioned with the approval of the Interstate Commerce commission. To these associations the individual railroads submitted their rate proposals before they were filed with the regulatory authorities. The associations were effective in preventing ruinous rate wars. In the opinion of the department of justice, the associations restrained free competition and hampered the individual railroads in taking action independent of other railroads, and were therefore illegal. The Bulwinkle bill, which passed the house in Dec. 1945 and was favourably reported by the senate committee, failed to come to vote in the senate. That bill, which would have legalized the associations, subject to supervision by the In-

Railroad marshalling yards in Paris were rendered useless by R.A.F. bombers in 1944, to prevent shipment of German troops or matériel to the Normandy sector after Allied landings on D-day



terstate Commerce commission, was strongly supported by the commission and most of the associations of shippers, but it was just as strongly opposed by the department of justice. Its enactment would have cut the ground from under the anti-trust suit which was still pending at the end of 1946.

In 1940 the anti-trust division of the department of justice instituted proceedings against Pullman incorporated, a holding company. It controlled the Pullman company, which owned and operated Pullman cars under contractual relations with railroads, and the Pullman-Standard Car Manufacturing company, which manufactured and sold passenger and freight cars for railroad use. The principal basis for the suit, which was tried before a federal three-judge expediting court in Philadelphia, was the allegation that the close contractual relationship between the Pullman company and the railroads gave the Pullman-Standard an undue advantage in selling cars to the railroads, and that it was prejudicial to the interests of other car builders. The decision of the court in Nov. 1943, upheld the department of justice and a dissolution was ordered. Pullman incorporated was given the option of disposing of its car-building subsidiary or its operating subsidiary. It chose to go out of operation and to confine its activities to car building. The Pullman cars of the Pullman company and its service facilities were offered to the railroads with the suggestion that the railroads organize a jointly owned operating company to purchase the equipment and take over the organization. In further court proceedings, when the proposed sale came on for approval, other bidders appeared but the court decided that the railroad bid should be accepted. The decision was appealed by the department of justice on the ground that railroad ownership would perpetuate some of the elements of monopoly. The case was still in the hands of the supreme court of the United States at the end of 1946. In the meantime, with court approval, the Pullman company continued to operate, service and maintain the cars pending further court action.

(See also INTERSTATE COMMERCE COMMISSION; NATIONAL

MEDIATION BOARD.)

(W. J. C.)

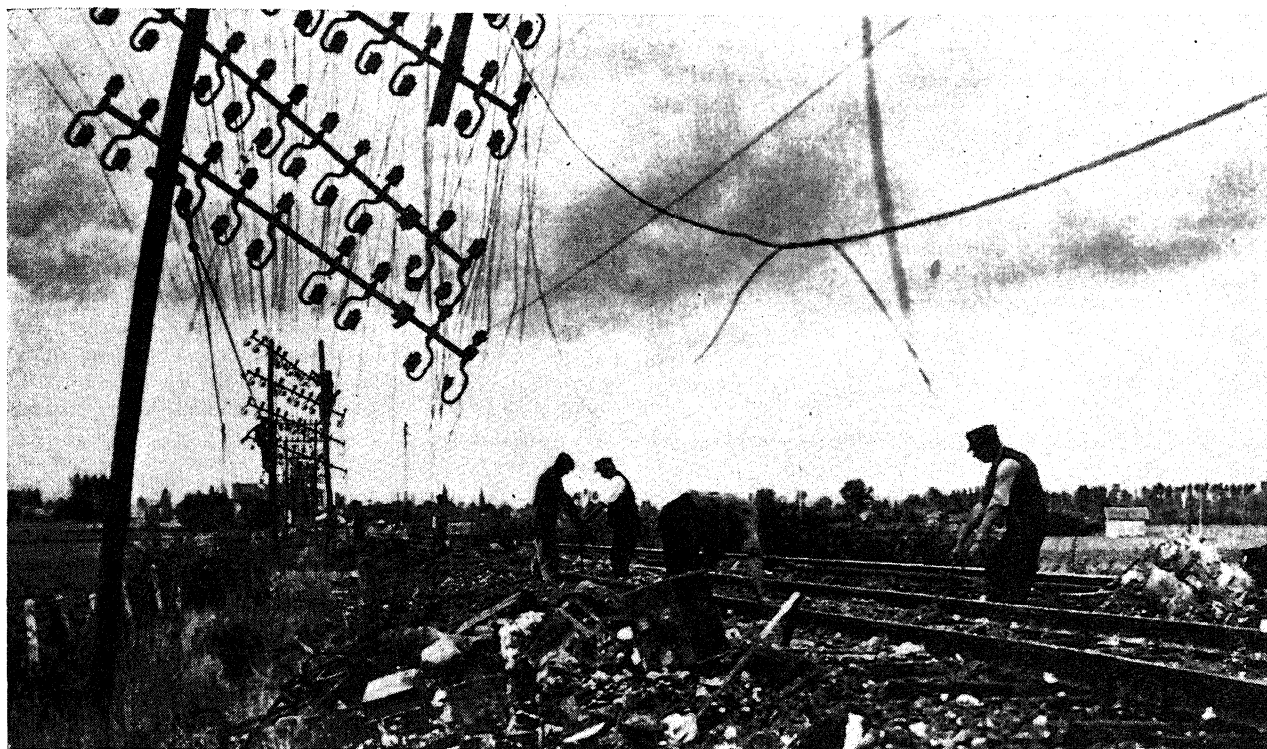
Great Britain.—The year 1937 was one of continuing recovery from the period of industrial and economic depression of the earlier 1930s, and the four British main line railways (the London Midland and Scottish, the London and North-Eastern, the Great Western and the Southern) together earned 3.43% on their capital. A recession in 1938 owing to the unsettled political situation reduced net earnings to 2.61%. The threat of possible war induced the minister of transport to appoint a Railway Executive committee (R.E.C.) in Sept. 1938 to act as an advisory body in the event of a national emergency. In Sept. 1939 this committee, in accordance with the Railway Control order, became the channel of communication between the minister of transport and the railways.

The R.E.C. had accomplished much preparatory work in the intervening 12 months, including plans for the evacuation of the civil population of London, requiring 4,300 trains to carry 1,430,000, and the constitution of its 16 subsidiary committees, corresponding to the committees of the railway clearing house in peacetime, drawn from operating superintendents, civil engineers, accountants, etc. Thus, when the minister of transport took over the railways by an order in council under the Emergency Powers Defense act (Aug. 1939), all was prepared to handle the essential priority war traffics. Further, the R.E.C. was to carry on as long as the control of the railways by the government continued, which was still the case in 1946.

On the financial side, an agreement was reached in 1940 by which the government guaranteed to the four railways and the London Passenger Transport board £40,000,000 as the guaranteed net revenue in the following proportions: L.M.S. 34%; L.N.E. 23%; G.W.R. 16%; S.R. 16%; L.P.T.B. 11%. This payment derived from the receipts and expenses of the controlled undertakings pooled as from Sept. 1, 1939. Of any further balance of net revenues in the pool, the balance up to £43,500,000 was to be paid to the controlled undertakings, any further balance up to £56,000,000 to be shared between them and the govern-

Tactical bombing of German rail communications along the German line of retreat supported Allied advances into western Germany during the early months of 1945. Here a railroad track at Dernau is shown after it was blasted off the ground





Reconstruction work on the French railroads, a critical factor in postwar industrial recovery in France

ment; any excess more than that figure was to be retained by the government. It was also agreed that railway charges would be raised to compensate for any rise in costs. As from May 1, 1940, on the recommendation of the R.E.C., these charges were indeed increased by 10%, applying also to rail fares of the L.P.T.B. Later the road fares of the latter were suitably adjusted. On Dec. 1, 1940, this 10% rise was increased to 16%.

Changed conditions in 1941, including the government's desire to prevent inflation and its policy in regard to the compensation for war damage in the case of public utilities, caused the government to claim a revision of the first control agreement and a second one operated after 1941. The latter granted the four railways and the L.P.T.B. together a guaranteed annual rental of £43,000,000, the exchequer retaining any balance of net receipts left in the so-called pool. In effect, this left the return on railway capital proper after 1940 on the 3.48% level. The government, by retaining all the surplus, had by the close of 1945 accumulated a profit of about £197,600,000. Provision was made for renewals of track, etc., deferred during the war years, by the formation of trust funds for each railway. Sums so reserved totalled £116,300,000 at the end of 1945. The year 1946 marked a turning point with the rapid fall in war traffic and in revenue, with the result that as from July 1946 the government, to offset a major reduction in the pool's net revenue, raised freight rates to 25% and passenger fares to 33% above prewar, with certain lower exceptions such as "season" and "workmen's" tickets.

On the traffic side, the British company-owned railways were called upon to face, in 1940-45, a series of crises and strains which they were in excellent condition to withstand. First came the extra load of mobilization of the armed forces and the civil evacuation from threatened areas in 1939. For the latter, more than 3,800 trains were run, exclusive of empties, and they carried more than 1,334,000 evacuees in Sept. 1939. During the six years 1940-45 a further 1,800 trains were run for this purpose, carrying

more than 1,000,000 passengers. Many others travelled by ordinary trains, though civil passenger services during the war years were cut by about 30% to make way for the heavy war traffic of troops and freight. The original dispatch of the British expeditionary force to France required the running of 261 special trains to Southampton alone in 27 days (Sept.-Oct. 1939), while the small expeditionary force to Norway in April 1940 demanded 202 specials. The evacuation from Dunkirk, for which no prearranged plans could be made, required 620 specials from the channel ports carrying 319,000 troops within a few days.

The arrival of U.S. forces in Britain, beginning in the summer of 1942, placed a further load on the railways, while later that year the dispatch of Allied forces to North Africa required 440 troop specials, 680 freight specials and 15,000 other wagons to be worked to the ports. To mount the "Overlord" landing in France on June 6, 1944, 80 troop and motor vehicle trains were scheduled daily, and during one week in June 1944, 271 trains conveyed 99,000 troops; from June 6, 1944 to May 7, 1945 (D-day to V-E day) the total number of specials worked for this purpose was 4,794. The number of special trains operated from Sept. 1939 to Aug. 11, 1945, on behalf of the government, counted separately for each railway, was 258,624 passenger trains and 279,935 freight trains, giving a grand total of 538,559.

This immense additional military traffic and the shortage of skilled staff provided many difficult problems. As distinct from the United States, the U.S.S.R., Germany and Belgium for example, where there were great increases, the British railway staff, numbering 588,517 in March 1939, rose only to 622,369 in March 1945. Of these, more than 90,000 were women, against only 25,000 in 1939. The locomotive shortage at times became critical, since the railways' construction and repair shops were largely allocated to war purposes. There were about 19,500 locomotives in 1939, and during the war about 240 steam or diesel units were handed over to the government. By Aug. 1945, the percentage of locomotives under or awaiting repair had

risen to 16.3, but the loan of about 850 British- and U.S.-built "austerity" type freight engines from 1943 onwards, until they were withdrawn for service abroad, materially eased the strain at a crucial period.

The changed direction of the flow of traffic, partly caused by the diversion of ocean vessels to western ports and the transfer of coal and other traffic from coastal vessels to the railways, compelled the widening of certain double-track main lines to four tracks, as between Cheltenham and Gloucester, the building of new marshalling facilities, as at Oxford and the construction of short cut-offs to provide alternative routes. Certain single-line branches were widened or provided with additional passing places, as between Didcot and Winchester. To ease the wagon situation, the 585,000 privately owned wagons were added to the common pool of the 650,000 owned by the railways. By more rapid loading and unloading, together with heavier loading per wagon, the war traffic offering was handled successfully, though ordinary civil traffic was somewhat reduced by zoning schemes under which the distribution of certain commodities was confined to the areas of production. In 1943, the peak year for freight, more than 45,000,000 wagons were dispatched. Passenger traffic continued to increase in 1944, with 1,276,000,000 journeys, reaching its peak in 1945. While much preparatory work had been done in air raid precautions after 1937 and nearly £1,500,000 had been spent in accumulating emergency stores for repair work, the first serious damage from air attack came in June 1940. By March 28, 1945 (the last instance), reported incidents of damage and delay by air raids totalled 9,239, of which 1,595 affected traffic facilities for not more than 24 hours. The worst periods were Sept. 1940 to April 1941 and June 1944 to Aug. 1944, when the flying bomb attacks took place on southeastern England. Incidents affecting the railways and the L.P.T.B. lines resulted in 900 fatal casualties and injuries to 4,450, of which about one-third were on the S.R. Altogether nearly 400 railwaymen were killed. The "black-out" at stations, yards and in trains, especially during the long winter nights, created operating difficulties and caused delays, but the safety record was remarkable, with an annual average of only 30 passengers killed and 42 seriously injured in train accidents for the six-year period 1940-45.

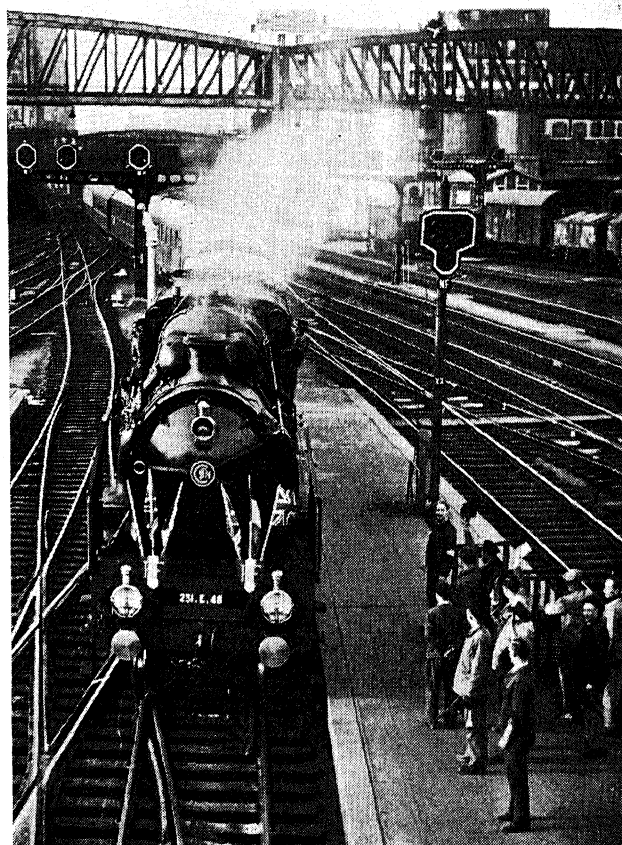
Despite all war traffic preoccupations, considerable long-range planning work was undertaken, aiming at improved design of passenger cars and steam locomotives, electrification, the increase of diesel traction and the extended use of metals, including lightweight materials for rolling stock. Several new types of locomotives were placed in service. Mention may be made of the "merchant navy" and "west country" type "Pacific" (4-6-2) classes for the S.R. and new 4-6-0 classes on the L.N.E.R. and the G.W.R. In 1946 the G.W.R. converted some of its steam locomotives from coal to oil firing, and the S.R. electrified further sections on the third rail system in the early war years. Progress was made in linking up the L.P.T.B. tube lines with those of the main line companies, but the large-scale plan for improvements of this character in the London area had to be shelved until 1946. In 1945 some of the cross-channel services were operated by the railway steamers, released from government requisition. Mechanized handling was extended at freight stations, as at Birmingham, and in road cartage. The number of containers increased greatly.

France.—In 1937, the four French company-operated railways with the state-owned and -operated, Etat (ex Ouest) and the Alsace-Lorraine railways were amalgamated into a

single French national railways system (Société Nationale des Chemins de Fer Français). The S.N.C.F. came into being on Jan. 1, 1938, and the coincidence of consolidation and government operation provided a major problem of organization. In fact, the reorganization of staff appointments and technical standardization had not been completed when war broke out in 1939, though the broad outlines of the new system had been laid down. Thus the Nord, the Est (with the Alsace-Lorraine), Paris-Lyons-Méditerranée, the Paris-Orléans-Midi and the Etat railways became respectively the Nord, Est, Sud-Est, Sud-Ouest and Ouest *régions* of the new S.N.C.F. Such a complete reorganization of a large country's railway system was almost without precedent, but, in spite of this period of unsettlement, technical progress was continued, and the conversion to electric traction of the Tours-Bordeaux main line was completed early in 1939, thus giving an electrified line throughout from Paris to the Spanish frontier at Hendaye. Similar conversion of the Mountauban-Brive section of the alternative main line to the Spanish frontier at Cerbère (for Barcelona) was begun but, owing to the war, was not completed until 1943. During World War II, plans were prepared for the conversion of the heavy traffic artery from Paris to Lyons, but little work, other than preparatory, had been begun by 1946. The year 1939 had witnessed the preparation of designs for standard locomotive types, passenger cars and wagons, but few units could be produced before 1946.

The invasion of France in May 1940, leading to partial occupation which finally extended to the whole country in Nov. 1942, caused immense damage to railway property, especially bridges. Not until 1943 were all the lines fully re-established, but by that time large-scale damage was

The Golden Arrow express arriving at Paris early in 1946 after completing the first scheduled postwar run between London-Calais and Paris



being caused by the Allied air attacks in preparation for the landing in Normandy in June 1944. These attacks before and after the landing, coupled with destruction caused by the retreating Germans, sabotage by French partisans to help the Allies and damage by the land fighting itself, created immense losses to the S.N.C.F., added to which was the steady removal of equipment from France for use in Germany, and German-occupied territories. When Paris was liberated in Aug. 1944, there was hardly any French main line capable of carrying traffic for more than a few isolated miles. Indeed, for some time Paris itself was cut off from the rest of the country by rail. The freezing and sterilization for a few vital weeks of the S.N.C.F. system was a major factor in the rapid liberation of France, but the material losses were heavy, especially at such key centres as Tours, Amiens, Orléans, Cambrai, Aulnoye, Le Mans and on the outskirts of Paris. Partly on that account, Paris was rendered indefensible and emerged almost unscathed.

Extent of damage to the French railways, Aug. 1944

Permanent way:	
Out of commission	11,185 mi. (out of 24,233 mi.)
Requiring reconstruction	1,988 mi.
Destroyed switches	10,000 pairs
Buildings, etc.:	
Large stations badly damaged	115 (out of 300)
Signal cabins destroyed	571
Large classification yards badly damaged	24 (out of 40)
Large locomotive depots badly damaged	74 (out of 130)
Bridges, viaducts, etc., destroyed or badly damaged	2,400
Tunnels obstructed	43

The energy with which the reconstruction work was afterward carried out reflected great credit on the French railways.

Equipment in 1938 included 16,000 steam locomotives; in Aug. 1944, only 3,000 were available for service. But by Jan. 1946 this figure had risen to more than 8,700. In 1946 large numbers built to French design in the U.S. were arriving in France and, together with an energetic repair program, helped overcome the critical shortage of power. In 1938 France had 478,000 freight wagons. By Jan. 1945 only 152,000 were serviceable, though there were many German, Hungarian, Belgian, Italian and other wagons in circulation. By the end of 1946 there were about 300,000 available and wagon loadings per week approached the prewar figure. Shortage of coal and deficiency in vital materials, such as ties and steel, delayed reconstruction, but by July 1946 only one main line remained cut through destruction by the Germans in Aug. 1944 of the large viaduct at Nogent-sur-Marne. Juvisy, Longueau and Tours classification yards were at work again, and passenger services had been rapidly re-established, though naturally not attaining the 1938 level in speed or frequency; nor were they entirely sufficient for the nation's needs. Of the 30,000 passenger cars of 1938, only 17,500 were left in May 1946.

Belgium.—Belgium's main railway network had long been government-owned and operated. As a solution to the financial difficulties following World War I, when the Belgian railway system suffered grievous losses, the system was reorganized as the Belgian National Railways company (Société Nationale des Chemins de Fer Belges). With the exceptions of (a) the light railway system, mainly narrow gauge, known as the *vicinaux*, (b) certain local lines such as the Malines-Terneuzen, later taken over, and (c) the Nord-Belge (affiliated with the Nord railway of France), the S.N.C.B. embraced the whole system. The lease of the Nord-Belge terminated during World War II, and its property and assets became part of the S.N.C.B. The German invasion of 1940 caused great damage, especially in the de-

struction of bridges, but by 1941–42 repairs were complete and, though much equipment had been removed to Germany, the S.N.C.B. was working normally. Though the port of Antwerp was practically idle, internal and transit traffic to France, to satisfy the needs of the occupying forces, was heavy. Sabotage grew during 1942–43, and Allied air attacks increased, becoming sufficiently strong to freeze railway movements on the main lines leading to France, before June 1944. As the Germans retreated, the Belgian railways suffered further losses through air attack, land battles and German destruction. Thus, after liberation only 1,944 mi. were operable out of a total of 3,238. In all, about 30 sections of line were blocked by destroyed bridges or other obstructions.

Allied commanders paid tribute to the fine reconstruction achievements of the Belgian railway staff, but the ordeal was not over, since flying bombs were directed on to Antwerp, Liège, etc. The Ardennes battle (Dec. 1944) did major damage to lines east of the Meuse. As a consequence, in Jan. 1945, 466 bridges required reconstruction, but by 1946 this figure had fallen to 44, though many repairs were of a temporary character. In 1940, S.N.C.B. locomotives had numbered 3,414 and by 1944 only 2,509 remained; however, by 1946 the number had increased to 2,743, and a further 300 were expected that year from the orders placed in the U.S. and Canada. Belgian shops had a further 100 on order. Passenger cars numbered 6,382 in 1940; 3,682 in 1944 and 4,335 by 1946. For months in 1945 the wagon situation was critical, the 1940 stock of 99,000 having fallen by then to 53,700. This loss, largely to Germany, held up the movement of coal and other vital traffic.

Belgian postwar reconstruction was notably rapid. Great efforts were made to achieve financial stability. Both fares and freight rates were increased several times, thus offsetting the devaluation of the franc, but it was inevitable that for a year or two there would be financial deficits. Further electrification was planned and the workshops of Malines and Louvain, largely destroyed, were rebuilt on the most modern lines. Belgium by 1946 had re-established most of its international traffic services and was still carrying much military leave and supplies transport for the Allied forces occupying Germany. As in many other countries, shortage of fuel limited train mileage.

The Netherlands.—Prior to the invasion by Germany in 1940, the Netherlands railway system belonged to a government-owned company. Several sections operated with electric multiple-unit type equipment for passenger services using overhead catenary feed, as for instance from Dordrecht to Rotterdam, Amsterdam, Eindhoven and Utrecht, while there were many diesel streamlined trains at work, running to Maastricht and Groningen. Except for damage to some of the great bridges over the Rhine and other rivers, little damage was suffered in 1940, and Allied air attacks never became as serious as they did in France and Belgium in 1943–44. The tragedy of the Netherlands railways started with the heroic strike of the Dutch railwaymen in the fall of 1944 when they hoped that the Allied offensive at Arnhem would bring liberation to Holland. The offensive failed and the Germans in revenge for the strike took whatever they could of the whole Netherlands railway's fixed and movable equipment, sending the electric and diesel train sets to Bremen and elsewhere, removing the steam locomotives, etc. and even the catenary structures, ostensibly to loot the copper. What could not be removed was destroyed.

There was probably no parallel in railway history to the Dutch experience; from Sept. 17, 1944, to May 5, 1945, Holland's railways and industry lay paralyzed. Figures told a fine story of reconstruction. Mileage operated (Sept. 1944) was 1,974, of which 62% was destroyed or removed by May 1945; by June 1946, 91% had been restored. Of 354 mi. of electrified lines, 92% was destroyed but by June 1946 electric trains were again operating over 115 mi. In Sept. 1944 daily passenger train mileage was 38,562, freight train mileage 24,375; in May 1945 comparative figures were 1,183 and 1,313 respectively, but by June 1946, 68% and 85% respectively of the Sept. 1944 figures had been achieved.

Germany.—In 1937 the German railway system, with the exception of a large number of purely local lines, often narrow gauge, was owned and operated by the Reichsbahn (national railways). In fact the director-general, Dr. Julius Dorpmueller, was also minister of transport. In 1938 the Reichsbahn absorbed the Austrian federal railways and later the lines in the Sudetenland; the 1938 figures of size were:

Route mileage	41,882	Track mileage	92,458
Steam locomotives	21,838	Electric locos	571
Passenger train cars . . .	81,176	Freight cars	591,658

When adjacent countries were overrun (Poland, Denmark, Norway, Holland, Belgium, France, Yugoslavia, Greece and large areas of the U.S.S.R.) the Reichsbahn had to provide a control staff, as also in Hungary, Rumania, Bulgaria and Italy.

The number of Reichsbahn employees, which stood at about 900,000 in 1939, thus rose to more than 1,600,000 in 1944.

The German war potential rested on the full functioning of its rail communications. Despite losses and damage in the U.S.S.R. and by air attack, the Reichsbahn locomotive position remained numerically strong, reaching a maximum of nearly 38,000 in mid-1944. Nevertheless, air attacks stopped the fluidity of traffic, thus preventing the distribution of such essentials as locomotive coal. It was calculated that by the spring of 1945 about 10,000 locomotives were unserviceable; indeed, by then the Reichsbahn was in a state of disintegration. After the close of hostilities in Europe the Reichsbahn of 1937 was virtually split into four systems, one for each of the four zones of occupation. Reconstruction proved slow and difficult, but in the British zone, out of 7,887 route mi. approximately 7,450 were working again in June 1946, against only 652 mi. a year earlier. The first important revival of international train services through Germany was the inauguration of the Nord express from Calais and Paris to Copenhagen and Stockholm in the spring of 1946.

Italy.—The Italian state railways were largely electrified in 1937 but electrification, which had been energetically pushed forward, was brought to a stop in 1940 when Italy entered the war. Italy later became a battleground from Sicily to Trieste, the Brenner pass and Modane, and although the Allied armies advancing northwards were compelled to reconstruct bridges and classification yards and to restore main line facilities from Reggio and Bari via Naples and Rome to Florence, Bologna and the northern cities, the Italian state railways system was largely in a derelict condition in May 1945. At one period all the bridges over the Po had been destroyed. Reconstruction can best be demonstrated by the fact that electric traction was resumed between Reggio di Calabria and Milan (820 mi.). Electrification of the Venice-Padua-Milan, the Domo-

dossola-Milan-Turin and the Padua-Bologna main lines were scheduled for completion in 1947. In all, 2,400 track mi. and 490 bridges and viaducts had to be reconstructed.

Austria.—In 1945 the Austrian federal railways were again separated from the Reichsbahn, though they were until 1946 operated under the quadripartite control of the occupying Allied forces. Further electrification to ease the fuel situation was planned and the Attnang-Puchheim to Linz and the Spittal to Villach sections were to be given priority.

Central Europe and the Balkans.—The damage to the Czechoslovak state railways, which had been separated into two systems during the German occupation—the Bohemian-Moravian protectorate system and the Slovak state railways—was mainly confined to loss of rolling stock, though war damage in Slovakia was heavy. In 1945 the prewar unified administration was re-established except for the lines in the most easterly section of the country which Czechoslovakia lost through a change in the frontiers.

The Hungarian and Rumanian state railways were called upon during World War II to handle an immense oil traffic from the Ploesti fields to Germany. This traffic, coupled with large-scale troop movements to the southern Russian front, strained the limited resources. War damage was heavy as also in Yugoslavia and in Greece, where practically no rolling stock was left in serviceable condition when liberation came. There were many major engineering features on the Balkan railways, a large proportion of which were destroyed, as on the lines between Athens and Salonika. Hence, traffic was still interrupted at many places at the close of 1946. Locomotives built in the U.S. and Great Britain were allocated to Yugoslavia and Greece.

Spain.—In 1937 there were four major railway systems in Spain, the Norte, the Madrid-Zaragoza-Alicante, and the government-owned Western and Andalusian systems, together with some local lines. All these were consolidated into one large government-owned system, the Red Nacional de los Ferrocarriles Españoles. Its primary task was the rehabilitation and reconstruction of the network after the disastrous period of civil strife, and steady progress was achieved. The first phase of electrification of the ex-Norte main lines stretching northwards from Madrid was completed.

Scandinavia.—Few railway systems made more consistent progress over the period 1937-46 than did the Swedish state railways. Two features stood out in their policy: first, the steady extension of electrified mileage; second, the taking over by the state of the various small company-owned railways. Thus the state railways grew to a route length of 8,216 mi. and nearly all the main traffic arteries had been electrified by 1945. Technical progress was also striking, exemplified in new electric locomotives and in the mechanized method of track renewal. Coal supply difficulties enforced the use of wood fuel on locomotives for a period and also prompted the energetic prosecution of the electrification program.

The Danish state railways after 1940 were prevented from extending suburban electrification in the Copenhagen area and during the war lack of oil fuel set back their dieselization program. The train-ferry services over the Great Belt suffered much during the unusually heavy winters of 1940 and 1941 and several of the vessels were damaged by mines. In 1946 prewar projects were resumed with vigour. In Norway the state railway system was extended for military purposes up the west coast towards Narvik, but the future of this military line remained problematical.

Switzerland.—The technical and managerial progress in many spheres which the Swiss federal railways achieved during 1937–46 was remarkable, whether assessed in terms of station design, electrification, track improvements, public relations or internal organization. Under difficult conditions the plans for complete electrification of all lines were steadily pursued until, by 1946, 95% of traffic was being hauled electrically. Swiss designs of lightweight passenger cars were structurally as remarkable as the designs in the U.S., while in regard to electric locomotive designs, the Swiss federal, together with its neighbour, the Bern-Lötschberg-Simplon, probably shared with the Swedish state railways the pre-eminent position in Europe. In 1946 a remarkable new ten-year program of improvements was being pursued.

U.S.S.R.—No reliable information of any kind became public about the railway system of this country, nor on the lines in soviet-occupied zones.

Asia.—In Asia the decade 1937–46 witnessed the construction of important new railway mileage. In 1940 the first passenger train left Baghdad for the through run to Haidar-Pasha, linking with the standard gauge, 4-ft. 8½-in. railways of Iraq, Syria and Turkey. By 1942 the Palestine and Turkish railways were linked by a standard gauge line through Beirut. Thus it became physically possible to operate through trains from the eastern side of the Bosphorus to Cairo and Alexandria. A vital link in the Allied war effort was the route in Iran from Bandar Shahpur to Bandar Shah on the Caspian. Operation over this line was immensely difficult owing to grades, climatic conditions and fuel and water problems, but by July 1944 the line was handling 10,000 tons a day, a magnificent achievement of U.S., British and Russian co-operation.

In India the policy of the central government in taking over the management of the company-operated railways continued throughout 1937–46. By 1946, with the exception of the lines owned and operated by certain of the Indian states, the government of India owned all the important mileage. Farther east, World War II left Burmese and Malayan railways in a disastrous condition, though the Japanese during their temporary occupation had, by forced labour, constructed certain links joining the Siam state railways with those of Malaya and Burma. Rehabilitation continued rapidly in this area. As a consequence of the defeat of Japan the South Manchurian system fell under joint Russo-Chinese control by the terms of the China-Changchun Railway agreement. By April 1946 the Japanese government railways' mileage open to traffic totalled 13,022 mi., involving 4,117 stations.

Africa.—Railway developments in Africa during 1937–46 were primarily aimed at increasing operating capacity. In South Africa the South African Railways and Harbours administration, which also owned and operated the harbours and air services, grew to be one of the largest railway organizations in the world, with a route mileage of more than 13,300. Improved signalling and new deviations to ease grades and curvature helped to overcome the difficulties which arose from inability to obtain new motive power or equipment until 1944–46. Large-scale electrification plans had to be temporarily postponed. The situation eased with the arrival of new locomotives; traffic in 1946 was still running at a very high level. South African railways workshops carried out large-scale orders for war stores. Garratt locomotives proved highly successful, not only in South Africa, but also on the adjacent Rhodesian railways and in Kenya-Uganda as they operated over comparatively light rails and severe curvature.

In 1941–42, some progress was made with the construc-

tion of the long projected Trans-Sahara line. Development of the Kenadsa coalfields thereby became possible, but little progress was reported after 1943, when the great trunk route from Casablanca to Tunis was being used to handle war traffic far above anything previously envisaged on the Moroccan, Algerian and Tunisian railways; many locomotives built in the U.S. were in use, and the Egyptian state railways were also assisted in the handling of peak traffic by the arrival of locomotives built for the Allied war departments. The Djibouti-Addis Ababa railway was returned to its French ownership in 1946.

Canada.—Canada's two great railway systems, the Canadian National railway (23,535 route mi.) and the Canadian Pacific railway (17,037 route mi.) were faced with major problems during the war period in handling huge passenger and freight traffic. Fortunately in 1939 both properties were in a high state of efficiency and maintenance, but few envisaged then that the work to be done in 1943–45 would approach, if measured in passenger-miles, three times the 1939 figure, and in ton-miles more than double. These increases demonstrated the inherent power of well-managed and well-equipped railways. They showed too, that the financial difficulties of the Canadian railways so frequently referred to before World War II, were primarily due to lack of traffic density.

While their main construction and repair shops were largely devoted to the production of war stores, the Canadian lines were hard pressed; but improved signalling facilities, such as the centralized traffic control installation on the Moncton-Truro section and the extension of automatic block signals on much of the C.P.R. mileage, assisted the satisfactory handling of war traffic between the Atlantic and the Pacific coasts. Almost unique to Canada was the linking of the railways with the development of air services, and the C.N.R.'s affiliate, the Trans-Canada Air Lines, with the latter's regular service across the Atlantic as well as from coast to coast, was a landmark in railway history. The C.P.R. similarly welded many small air lines into one entity, the Canadian Pacific Air Lines, radiating out from the Trans-Canada east to west artery, and thus reaching far into the northland.

Mexico.—The railway position in Mexico for many years before 1937 had been unsatisfactory and the national railways had suffered from repeated changes in organization and executive personnel. At one period management lay in the hands of the workers themselves, but this proved far from successful. With expert technical advice obtained from the U.S. a large-scale rehabilitation program was inaugurated in 1941 and continued till 1946. A new board of management under the presidency of the under secretary of the Mexican government achieved consistent progress. By 1945 fast freight through trains operated between Mexico City and several interchange points on the U.S. railroads; the roadbed had been strengthened with heavier rail and much added ballast, and a large number of diesel locomotives were already in service, with further similar units due for delivery in 1946.

South America.—Railway construction continued spasmodically during 1937–46 in South America, but the main problems concerned finance and fuel. The latter proved most intractable, even maize being used to keep trains operating in Argentina. Successive shortages in coal and oil forced repeated conversions from one fuel to another in the case of steam locomotives, and in Brazil electrification was largely adopted as a solution. Inadequate return on capital impeded the financing of renewals, thus

strengthening the tendency of governments to take over certain lines, for example the Arica-Tacna in 1942. Largely cut off during World War II from sources of supply in the U.S. and Europe, the railways had to adopt ingenious methods for meeting recurrent shortages in important materials. The labour situation was not easy.

Progress in physical extension was made on the Salta line, linking Argentina to Chile at Paso de Socompa, 221 mi. from Antofagasta, scheduled for completion in 1947. In 1943, agreement was reached to reconstruct the Transandinine railway, out of service since 1934. Brazil planned the electrification of the Sorocabana railway and the Central do Brasil, while the Paulista line planned to convert its line to Bauru, and the São Paulo its section to Jundiahy. Further suburban electrification in the Rio de Janeiro area was under consideration by the Leopoldina. In 1946 the international railway bridge was opened between Brazil and Argentina at Uruguayana-Paso de los Libres.

Australia.—The entry of Japan into World War II affected the whole Australian railway situation. Front line conditions faced the section of the commonwealth railways in the Northern Territory, while northern Queensland temporarily became a war zone. Locomotives had to be loaned from one state administration to another or to the Commonwealth. The difficulties arising from the variation in gauges, such as the 3-ft.-6-in. gauge in Queensland, Western Australia, Tasmania and parts of the South Australian and commonwealth railways, the 4-ft.-8½-in. gauge in New South Wales and on certain commonwealth lines, and the 5-ft.-3-in. gauge in Victoria and South Australia, drew attention once more to the desirability of a vast gauge standardization project. The design of this scheme, of great strategic and economic importance, was allocated to Sir Harold Clapp. The plan he put forward in 1945 provided for the modernization of the various Australian state systems. Divided into three proposals estimated to cost £A77,000,000 (\$247,000,000) in all, the main features embraced: a new standard gauge line Fremantle-Perth to Kalgoorlie, conversion of the 5-ft.-3-in. mileage in Victoria and in South Australia to 4 ft. 8½ in. and conversion of some 3-ft.-6-in. mileage to 4 ft. 8½ in. in the latter state; conversion to standard gauge of the Port Pirie-Broken Hill route; construction of a new 4-ft.-8½-in. standard gauge line from the New South Wales border to Northern Queensland and involving the conversion of considerable 3-ft.-6-in. gauge mileage in Queensland; and conversion of the 3-ft.-6-in. gauge Birdum-Darwin section of the commonwealth railways in Northern Territory. The scheme was a long-term project, and certain amendments undoubtedly would be agreed to in view of the conflicting interests of the individual state administrations. On several state systems the heavy war traffic converted financial deficits, after the payment of fixed charges, into healthy surpluses, as, for instance, £A775,000 (\$2,487,000) in New South Wales in 1943, but rising wages together with the difficulties of replacing rolling stock and motive power made the immediate prospects more sombre. In New South Wales the opening to traffic of the new bridge over the Hawkesbury river in 1946, a very difficult engineering feat and long under construction, was an event worthy of record.

New Zealand.—The situation of the New Zealand government railways was comparable with that in Australia. Though the war zone remained more distant, the increase of traffic on a system less developed from the viewpoint of

traffic density provided its own special problems. By efficient management all demands were met satisfactorily, but inability to obtain new locomotives long on order and shortage of fuel, a difficulty which faced the Australian railways also, made operation complex. The New Zealand transport position benefited substantially from the extent to which rail and road co-ordination had been achieved in the immediate prewar period, and important savings were obtained through the elimination of mixed trains. Large-scale plans for widenings, station improvements and further electrification were held up during the war, but considerable progress was achieved in linking up previously isolated sections with the main line systems in the North and South islands. (See also BUSINESS REVIEW.) (C. E. R. S.)

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Rainfall

See FLOOD CONTROL; METEOROLOGY.

Raisins

See FRUIT.

Ralston, James Layton

Ralston (1881–), Canadian statesman, was born Sept. 27, 1881, at Amherst, N.S. A graduate of Dalhousie law school, he was called to the bar in 1903 and practised law in Nova Scotia. In 1916 he went to France as a major of a Canadian infantry battalion, which he commanded from April 1918 until its demobilization in June 1919. Awarded the distinguished service order with bar, he was made a Companion of St. Michael and St. George and was twice mentioned in dispatches. In 1924 he was promoted to the rank of colonel. He accepted the portfolio of minister of national defense in the federal cabinet in Oct. 1926 and was elected to the house of commons by acclamation the next month. In 1930 he was a delegate to the London naval conference and was again elected member of parliament from Nova Scotia in the elections of that year. With the defeat of the Liberal party in Aug. 1930 he resigned and returned to private practice at Montreal.

On Sept. 6, 1939, he was appointed finance minister in the Mackenzie King cabinet and on Jan. 2, 1940, he was elected by acclamation to the house of commons as a Liberal member for Prince Edward Island. In June 1940, he took over the portfolio of minister of defense, left vacant by the death of Norman McLeod Rogers. Ralston's resignation from the cabinet was announced Nov. 2, 1944. It was understood that the minister of defense quit in protest against the government's refusal to compel military conscripts to serve overseas.

Ramsay, Sir Bertram Home

Sir Bertram Ramsay (1883-1945), British naval officer, was born at Coldstream, Berwick. Son of an army officer,

he broke with the family tradition and joined the royal navy at the age of 15, later studying at the British Naval Staff college. He commanded the celebrated Dover patrol during World War I. In the peaceful interim between the two World Wars, he alternated his assignments on the staffs of the Naval War college (1927-29) and the Imperial Defence college (1931-33) with periods of active duty. He retired in 1938 with the rank of vice admiral, but returned to active duty at the outbreak of World War II. He was in charge of naval operations during the evacuation of British armies from Dunkirk, May-June 1940, and was made a knight commander of the Order of the British Empire in 1943, in recognition of his part in that operation.

Sir Bertram was naval commander in chief of the Anglo-U.S. expedition that landed in North Africa, Nov. 8, 1942, helped plan and direct the Allied landings in Sicily and Italy and was commander in chief of the Allied navies that supported the invasion of France in June 1944. He was killed Jan. 2, 1945, when his plane crashed near Paris, France.

Rapid Transit

See ELECTRIC TRANSPORTATION.

Rare Earths

See CHEMISTRY.

Rates of Exchange

See EXCHANGE CONTROL AND EXCHANGE RATES.

Rationing

Consumer rationing and price control were used by most nations of the world during the years of World War II. With the major part of the world's productive effort going to support the war, these controls were used to provide a measure of economic stability and to secure fair distribution of scarce, essential goods.

In all belligerent, and in many neutral countries, the diversion of machinery and materials to war production created shortages of most consumer goods. At the same time, rising employment and competition for labour swelled the national income, resulting in increased demand for the very goods which were becoming more scarce.

The more complete the channelling of resources into war uses, the wider became this gap between demand for consumer goods and the supply. Under such circumstances, plans limiting consumption and assuring fair distribution of essential goods to all consumers were necessary for successful prosecution of the war. Civilians had to be fed, clothed and housed, if war production was to be maintained and increased. Transportation had to be provided, both for war jobs and for essential civilian activities. Civilian morale had to be maintained at the highest possible levels. These things could be accomplished only if living essentials were available and equitably distributed. Rationing introduced the criteria of need and fairness in place of the usual criterion of ability to pay. It reduced consumption of goods in short supply and prevented some from obtaining more than their fair share. Other measures, such as compulsory or voluntary savings plans, increased taxes and curtailment of consumer credit helped reduce money demand for all goods.

Many governments found it necessary not only to make supplies available to meet ration demand, but to make them available at prices consumers could afford to pay. Government purchase, with resale at lower than open market prices, and subsidies helped achieve this goal. In

the United Kingdom, Sweden and Switzerland, all individuals were assured their rations even though they could not pay the full purchase price.

Administration.—To ration effectively, it was necessary not only that total supplies be adequate to meet minimum requirements, but that rationed goods be available wherever consumers had ration currency to spend. The central rationing authority usually had control of the supply of rationed goods and directed distribution as nearly as possible to match the "ration demand" in each locality. Dealers were registered and inventories were limited with the objective of spreading supplies to all areas and all dealers. Allowable inventories were determined by the ration demand—either by the number of consumers registered with a particular dealer, or by the amount of ration currency consumers spent with each dealer during a given period.

While fair distribution required that rationed goods be available when and where consumers had ration stamps to spend, unforeseen shortages, transportation difficulties, or mistakes in distribution planning sometimes upset ration schemes, thus leaving some consumers without their share of rationed goods. No ration plan worked perfectly, and miscalculations and mistakes were frequent in the early stages of most ration programs in almost every country.

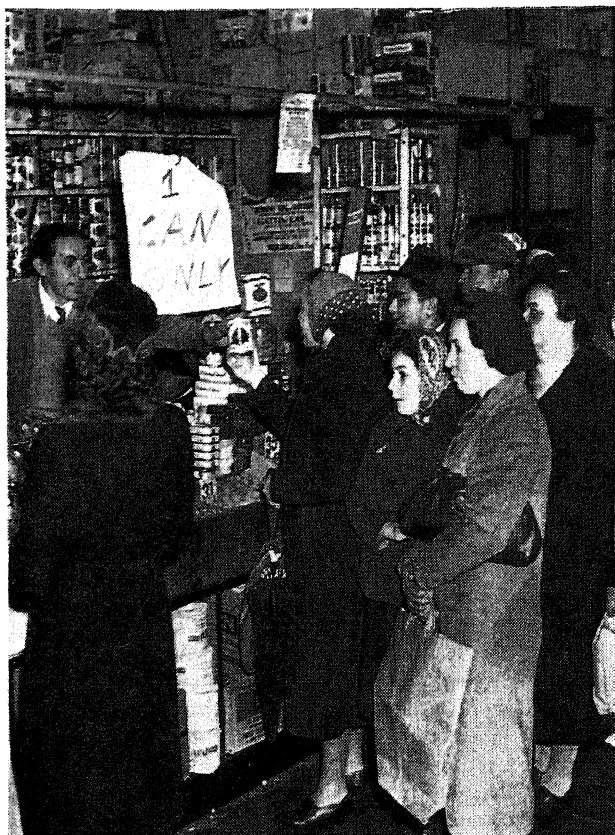
While a central authority devised the ration plan to be used, set the ration level for the "normal consumer," and established criteria under which differential rations would be provided to meet certain kinds of individual requirements, many determinations were necessarily left to local authorities. In the United States, local ration boards determined how much gasoline each automobile owner could use. In most countries local authorities passed on individual eligibility for differential food rations.

Registration.—Consumer rationing was usually preceded by a consumer registration for the purpose of determining eligibility of each individual and for placing in his hands an initial supply of ration stamps or coupons. Once a supply of ration currency of different kinds was distributed, additional rationing programs could be placed in effect without prior notice to the public.

The initial registration for rationing in the United Kingdom was carried out in Sept. 1939, but rationing did not begin until Jan. 8, 1940. Germany had prepared so well in advance of the war that food rationing began there almost immediately after hostilities began. In the United States, automobile tire sales were frozen immediately after Pearl Harbor was attacked, and rationing began Jan. 5, 1942, through individual determinations of local ration boards. The first general consumer registration in the United States, which preceded sugar rationing, did not take place until May 4-7, 1942, since ration planning was begun only after the United States entered the war.

Methods of Rationing.—Three basic methods of consumer rationing were employed during and after World War II. These were *unit* or *specific* rationing, *point* rationing, and *certificate* or *purchase permit* rationing. Each placed in the hands of consumers "ration currency" in the form of stamps or coupons, tickets, certificates or purchase permits.

Unit rationing was generally used to distribute specific quantities of single commodities like sugar, shoes or gasoline, or two or more substitutable commodities, like margarine and cooking fats. It was used for all foods rationed in Germany and in German-occupied Europe, where the allocation of each consumer's share of each



Food rationing to insure a just distribution of scarce foodstuffs among U.S. consumers during World War II became effective in 1942. Carried out mainly through the ration book system, it was often made more equitable by voluntary efforts of retail dealers, as illustrated in this picture

group of foods was determined by rationing authorities, little choice being left the consumer. The plan was also adapted to ration commodities needed in different amounts by different individuals. For example, in the United States, unit rationing provided all consumers who had automobiles with the same basic gasoline ration, and gave additional quantities to certain consumers on the basis of their transportation requirements.

Point rationing's essential feature was that it permitted the consumer to select any item he wished from items rationed under the same program. In Britain, several foods not wanted alike by all consumers were rationed under a single point program. This included canned meats and fish, canned fruits and vegetables, dried fruits, beans and peas, condensed milk, breakfast cereals, biscuits and preserves, jams and syrups. Each commodity was assigned a point value and the consumer spent his points for the foods he preferred. A separate "personal points program" provided equal points to all persons for obtaining chocolates, confections and other sweets. In Britain, on the continent of Europe, in Australia and New Zealand, clothing was rationed on point plans. In the United States, a single "red point" program, using red stamps, grouped meats, butter, margarine, edible fats and oils, cheese, condensed milk and canned fish. A "blue point" program, using blue stamps, included canned fruits and vegetables, fruit juices, soups, baby foods, and for a limited time dried fruits, peas and beans, and preserves.

Certificate rationing involved issuance of a ration certificate or purchase permit only to those who could prove their need for the rationed goods. Some of the commodities rationed on this plan were household furniture in Germany and in the United Kingdom, automobiles and

tires in the United Kingdom and the United States.

Ration Currency.—Ration coupons were usually issued in series, differentiated by design, colour, numerals or letters. Designated coupons were usually valid for stated periods. In this way the number of coupons currently valid, which in effect determined ration demand, could be adjusted to available supplies.

For some commodities, retailers were required to detach ration coupons. For others they cancelled coupons presented to them in exchange for rationed goods. When cancellation was required, the consumer was permitted to buy only from the retailer with whom he was registered. The retailer used his registration for obtaining replacement stocks. When coupons were detached, they were used as money is used for buying goods.

Ration "currency" passed through trade channels to the producer, the manufacturer or the primary supplier who in turn accounted for it to rationing authorities by showing a balance between goods sold and currency received. Great Britain and the United States used their nations' banks to handle ration currency. The United States also used one-point "tokens" to facilitate retail transactions and to reduce the volume of paper stamps handled.

Food.—For most of the world, rationing during World War II meant food rationing. It was the sole rationed commodity for which all consumers were eligible for individual weekly or monthly shares.

The severity of the civilian food ration varied widely with productive resources of the country, the proportion of the supply needed for the armed forces (or for Allied or occupying armies), with availability of transportation, the extent of dependence on imports and ability of the central government to control supply from the point of production to ultimate consumption.

With effective central and local administration and a level of supply reasonably adequate to meet minimum consumer requirements, rationing proved to be the most satisfactory way of maintaining fair distribution. But when supplies of civilian goods fell below minimum requirements, both price control and rationing were extremely difficult to administer. They failed altogether in Greece, and for a time in France, during the German occupation, in areas of the middle east and in much of China and India. Mass feeding and local distribution of foods available from time to time provided substitute measures.

In countries which normally produced most of their food, including the United States, Australia, New Zealand and Canada, rationing first became necessary for imported foods such as coffee and sugar. Tea was rationed in Australia and in New Zealand. As requirements of the Allied forces increased, and consumer purchasing power expanded, it became necessary to broaden food rationing in these countries.

In areas dependent on imports for a substantial part of their food supplies, it was difficult to make necessary quantities available. Germany met this problem during most of the war by drawing heavily on occupied areas to make up its own deficits, leaving critical distribution problems in such areas.

In the United States, sugar rationing began in the spring of 1942. A year later items already listed under the "blue" and "red" point programs were added. Coffee was rationed for nine months beginning Nov. 29, 1942.

Canadian rationing was less extensive than that of the United States. Sugar, butter, meat, preserves, coffee and tea were all included at one time though the list of rationed foods changed as supplies fluctuated.

In Germany and German-occupied Europe, food rationing was considered "total," since virtually no foods were available outside the ration after potatoes were rationed in 1942. Even restaurant meals required ration coupons.

In the soviet union, all staple foods were included in the ration system, but not the entire food supply. In addition to the ration, consumers with money could buy extra food in a legal price-free market in which collective farmers could sell their "share in kind," or in a price-controlled government store in which prices were comparable to those in the open market but much higher than prices of the rationed supply.

Contrasted with "total" food rationing in most of German-controlled Europe, such important basic foods as bread, flour, potatoes, fresh vegetables and home grown fruits remained ration-free in the United Kingdom.

Governments of the middle and far east, except Japan, were concerned primarily with control of prices and supplies of bread and bread grains, their principal foods. Adoption of uniform rationing was seldom practicable for broad areas, and formal rationing was used primarily for distribution of food to urban populations.

In Japan, food rationing began in 1941 and became progressively more severe as the war continued. As shortages increased, the government found it necessary to control all staple foods, setting aside quantities to meet military requirements and distributing the civilian supply through food corporations administered by the local governments.

In most South American countries, shortages of consumer goods, coupled with inadequate price control and swollen purchasing power, created maldistribution. But comprehensive rationing was not undertaken. The few ration programs that were introduced, were widely evaded.¹

Rations in Germany, Denmark and Bulgaria during the first four war years were equivalent in caloric value to prewar consumption though they fell sharply during the fourth year of war and after. By contrast with adequate German rations in the first years of war, rations of the non-German population in Poland equalled only 50% of prewar consumption, while Jews were limited to half the ration of the Poles—a level so low that it meant starvation for those unable to add to it in some way.

Other countries fell between these extremes. Rations in northern Italy and in France were from 50% to 70% of requirements based on prewar consumption; in Belgium, Norway, the Baltic states and Slovakia they were 70% to 90% of requirements. The Netherlands, Finland and the protectorate of Bohemia-Moravia appeared to suffer little serious caloric deficiency.² Consumption in occupied Russia was severely curtailed, though steady improvement was achieved after the occupying forces were pushed back to Germany.

When nearly all foods were rationed, it was necessary to provide extra or "differential" rations for those who needed more or different foods than the general ration provided. Extra food for workers in heavy industry, special diets for the sick, milk for children and nursing mothers—these and other food needs that could not be met by increased consumption of unrationed foods, were met in most countries by differential food rationing.

In the soviet union, in Germany and in most of occupied Europe, several categories of consumers were established according to their food requirements. The four main categories of consumers in Russia included: manual workers, office workers, adult dependents and children under 13. Manual workers received the highest rations;

children received extra rations of milk and dairy products. In the United States, meat and fats and oils became very scarce in the spring of 1945, and demands of miners led to establishing direct differentials for them and for loggers.

While it was not necessary to differentiate as sharply between categories of consumers in the United Kingdom as in countries with total food rationing, differentials were provided in three ways. (1) Different types of ration books, representing different food allowances were issued to adults, to children from 5 to 13 years, and to children under 5 years. The child's ration of meat was one-half that of adults, and children under 13 were not permitted a tea ration. Children under 5 had preference in buying milk, eggs, oranges, cod liver oil and vitamin preparations, also available to expectant and nursing mothers; (2) a canteen feeding program for workers in industry provided substantial ration-free additions to the diet; (3) feeding programs were established in schools.

Restaurant meals were unrationed, though restrictions were placed on the allowances of foods served.

Clothing and Textiles.—In the United Kingdom, and virtually everywhere on the continent of Europe, clothing rationing was as severe as food rationing. Under the point system employed, consumers used their points for articles of their choice from the limited supplies available. Differential rationing was necessary to provide some workers with articles such as industrial footwear or heavy outer garments.

Clothing rationing began in Germany in Nov. 1939 and in the United Kingdom in June 1941. The level of rationing in both countries was sharply below prewar use and inadequate to meet normal wardrobe replacement. Clothing was also rationed in New Zealand and Australia beginning in 1942.

The United States considered rationing in the spring of 1942, but optimism about the course of the war and resistance to additional economic controls caused the plan to be discarded. In consequence, clothing and textiles became increasingly scarce in the last two years of the war. Severest shortages developed when demobilized men began to put a heavy demand on already depleted stocks of suits, overcoats, shirts, while production lagged.

Standardization of apparel and production of utility textiles greatly aided clothing rationing in Britain, Germany, Russia and in occupied Europe. When very short supplies of such items as shoes and heavy outer garments made it necessary to superimpose the purchase permit plan on the point rationing program, consumers were able to obtain these articles only if they could meet a strict test of need.

Furniture.—Furniture and household equipment were strictly rationed in Great Britain and on most of the continent of Europe. The list of eligibles was restricted to new families, to those who had lost furniture through bombing raids and similar cases. Heating and cooking stoves and mechanical refrigerators were the only household goods rationed in the United States.

Fuel and Fuel Oil.—Fuel was rationed on most of the continent of Europe, where a variety of plans drastically curtailed consumption. In Great Britain, a fuel rationing program was completed in the spring of 1942, but resistance to further rationing and belief that voluntary restriction would be more satisfactory, led to postponing formal rationing several times. Instead, a series of restrictive orders was issued. Voluntary restriction, based on percentage of use before the war, resulted in many inequities which brought protests.

¹Canada Wartime Prices and Trade Board, *World Inflation*, (July 1944).

²League of Nations, *Food Rationing and Supply*, p. 40, (1944).



English housewives waiting in line for fresh eggs imported from Canada. This and other food items became increasingly scarce as World War II progressed, and extensive food rationing was still in force on Dec. 31, 1946

Fuel oil was rationed in those parts of the United States heavily dependent on it for heating and cooking. Consumers were required to register with a single dealer.

In the United States, with its high per capita rate of automobile owners, gasoline rationing was important and controversial. All automobile owners were provided with a basic ration, the amount fluctuating with the level of supply. Additional rations were provided for "home to work" driving, and preferential rations were given those with occupations considered essential to the war effort or to community health and welfare.

Gasoline use was restricted to a few essential users in most other areas of the world, the amount dependent on imports.

Motor vehicles, tires and equipment were rationed in most countries where they were available.

Other Items.—Many less important items were either rationed or restricted in use, as tobacco in Germany and in other parts of Europe, wine in France, alcoholic spirits in parts of Europe and in parts of the United States. Limits were also imposed on rail travel in most countries in Europe. Air travel was subject to priorities in most of the world.

Soap shortages developed in every country as the result of worldwide shortages of fats and oils. Rationing helped distribution somewhat in the United Kingdom and on the continent of Europe, but soap was almost unavailable in some areas for long periods. In the United States, where the supply and rationing agencies recognized the need for rationing, administrative difficulties and trade resistance kept the program that was planned from being put into operation.

Continued price control and rationing were necessary even after the close of the war, pending return to normal production and restoration of transportation facilities, to get adequate distribution of still limited supplies.

Some Allied countries instituted a tighter postwar rationing program than would otherwise have been necessary in order that part of their food supply might be used to re-

lieve famine or near-famine conditions in the Balkans, Italy, Poland, some parts of western Europe, India and China.

In the spring of 1946, for example, with most grain reserves in the world depleted, the United Kingdom rationed bread for the first time.

The concept that the general welfare was served by assuring minimum living standards to the population as a whole was greatly broadened by wartime experience. In the United Kingdom, the British dominions and the United States, general improvement in standards of living and maintenance of adequate levels of living for all, permitted the maximum national effort to be exerted in prosecution of the war.

In most of the western world, this concept of maintaining minimum living standards for all, in peace as well as in war, was growing.

The one long-term effect of wartime rationing might be to increase the determination of all nations to assure their peoples freedom from want. (See LAW; PRICE ADMINISTRATION, OFFICE OF.)

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Rayburn, Sam

Rayburn (1882—), U.S. legislator and politician, was born Jan. 6, 1882, near Kingston, Tenn. A graduate of East Texas college, he studied law at the University of Texas and began practice in Bonham, Tex. Elected to the U.S. house of representatives in 1912, he assumed his seat March 4, 1913; thereafter he served in this post from the 63rd through the 80th congresses. Rayburn, who was majority leader for the 75th and 76th congresses, was elected by acclamation, Sept. 16, 1940, to succeed William B. Bankhead as speaker of the house in the 77th congress. While Rayburn supported Pres. Roosevelt on foreign policy, he was antipathetic to many of the New Deal's domestic measures. He was renominated for speaker of the 78th and 79th congresses. Although re-elected to the 80th congress, Nov. 5, 1946, the Republicans, having won a majority, elected Joseph W. Martin, Jr., to succeed him as speaker, on Jan. 3, 1947.

Rayon and Other Synthetic Fibres

The world produced an average of 2,200,000,000 lb. of rayon annually during 1937-46; in the previous decade, the average per year was 650,000,000. In that contrast was illustrated the phenomenal rise of the world's youngest textile fibre. The ten years after 1937 saw the continued rise of the filament rayon first introduced on a commercial scale following World War I, and the marked growth of rayon staple. In 1936 the production of rayon staple was 299,000,000 lb. The peak of world production during the decade was in 1941, when 1,563,000,000 lb. went into cloth that displaced cotton, linen and wool, all of which it could be made to resemble. In that year, Germany alone turned out 640,000,000 lb., with Japan and Italy following in second and third place (296,000,000 lb. and 292,000,000 lb. respectively). The United States ran fourth with 122,000,000 lb. Totals of world production of both filament and staple types are shown in Table I for the ten-year period.

Table I.—World Rayon Production, 1937-46
(Millions of Pounds)

	Filament Yarn	Staple	Total Rayon
1937.	1,204	622	1,826
1938.	996	911	1,907
1939.	1,150	1,147	2,297
1940.	1,182	1,293	2,475
1941.	1,272	1,563	2,835
1942.	1,200	1,480	2,680
1943.	1,163	1,410	2,573
1944.	1,033	1,049	2,082
1945.	934	596	1,530
1946.	1,100	700	1,800

The upward trend in production was interrupted in 1942 by war losses in several of the important countries, notably Italy, Japan, France, the Netherlands and Belgium. In Italy, total production dropped from 318,000,000 lb. in 1942 to 6,000,000 in 1945. Germany, too, in spite of the fact that it depended almost entirely on rayon in place of lost cotton and wool supplies, decreased production from the high of 902,000,000 in 1943 to 250,000,000 in 1945. Great Britain and the United States, on the contrary, showed an increase during the period. In 1942 British production was 124,000,000, and that of the United

States 632,000,000. In 1945 the British total was 145,000,000 and in the United States, 792,000,000 lb. In 1946 the United States topped its previous records by producing 853,900,000 lb. of rayon filament yarn and rayon staple, thus accounting for about 47% of the world total.

Rayon's Coming of Age.—In 1937 many of the uses for rayon that later became commonplace were discussed only as new ideas. Rayon tires for automobiles, rayon sails for boats, rayon sheer hosiery were reported as innovations, and there was constant discussion as to the continued growth of rayon dress fabrics. In Sept. 1937, the Federal Trade commission opened hearings in Washington, D.C., on the proper identification of rayon or manufactured cellulose fibre in yarn and manufactured articles. The commission ruled on Oct. 26 of that year that it was an "unfair trade practice" to sell rayon fibre or articles made therefrom without disclosure of the fact that it was rayon. Rayon was officially defined as a generic term for manufactured textile fibre or yarn produced chemically from cellulose or with a cellulose base regardless of whether it was made under the viscose, acetate, cuprammonium, nitrocellulose or other processes. The rules were announced by the United States governmental agency as a protection of the purchasing and consuming public and included references to the qualifying use of the word rayon when fabrics were described as taffeta, chiffon, crepe, etc.—terms commonly used in reference to silk fabrics. But the rules actually resulted in the high lighting of rayon as the fibre of which almost all dress fabrics and many upholstery fabrics were being made in all price ranges. The day following promulgation of the rules, retail stores throughout the United States, because of the requirements, used the word rayon freely in their advertising of fabrics, household furnishings and garments. The extent to which the fibre had

U.S. mountain troops climbing with the aid of nylon ropes. Nylon proved a suitable rope material because of its strength, resistance to abrasion on rocky terrain, and elasticity



748 taken hold of the textile market was revealed for the first time. From then on, rayon was an accepted member of the textile family, and appreciation of its progress as a fibre adaptable to many uses became publicly recognized. The new rules meant revision of many statistical compilations which had not previously separated rayon from silk data. Government reports were revised, and text books were rewritten.

The invasion of rayon into the silk field was already an accomplished fact by the end of 1937, but its competition with cotton fibre was not recognized until April 1938, when it was proposed in the United States Senate that a tax be imposed on rayon yarn at a flat rate of six cents per pound to help pay the subsidy to cotton farmers. The bill itself was introduced by a senator from a wool-growing state, who may have cast a prophetic eye to the time when rayon staple would invade the wool market, as actually happened on a wide scale during World War II. The tax was not levied, but the reason for its proposal continued to be a matter of contention throughout the period.

In Oct. 1944, the Southern Regional Research laboratory at New Orleans, La., published a *Survey of Development and Use of Rayon and Other Synthetic Fibers* which carried in its introduction the following: "Farmers in the United States have several good reasons for carefully studying the production of synthetic fibres in this country and abroad. Rayon, the most important of these synthetic fibres, has already displaced considerable quantities of both cotton and wool, as well as silk, for use in clothing and household fabrics. It is now also proving to be an important competitor in certain industrial uses. For example, in the field of tire fabrics, the largest single use for cotton in the United States, rayon is now being used extensively for certain classes of military vehicle and airplane tires as well as for large size commercial truck and bus tires. . . ."

In Aug. 1938 the U.S. Rubber company and the Good-year Tire and Rubber company announced the marketing of rayon passenger car tires for the first time. In 1938 also came the first trade announcement of nylon as a new, non-cellulose base yarn which could not be accurately described as rayon but was recognized as an important step forward in synthetic fibres.

So rapidly were new man-made fibres developing at this time that in Feb. 1939, the *Journal of the Society of Dyers and Colourists* in Great Britain issued a classification of such fibres as follows:

- Group I—Rayon regenerated cellulose fibres made up of the viscose, cuprammonium and nitro-cellulose rayon yarns and staple fibres
- Group II—Rayon—Cellulose derivative fibres made up of cellulose acetate yarns and staple fibres
- Group III—Natural protein fibres, primarily made from milk casein and produced in the form of short staple fibres rather than continuous filament
- Group IV—Nylon—synthetic protein-like fibre made from coal, water and air and officially defined as "Nylon is the generic name for all materials defined scientifically as synthetic

fibre-forming polymeric amides having a protein-like chemical structure derivable from coal, air and water or other substances and characterized by extreme toughness and strength and the peculiar ability to be formed into fibres and into various shapes such as bristles, sheets, etc."

Group V—Synthetic resin fibres with an all chemical base such as vinyl or acrylic and which do not utilize as raw materials any vegetable or animal substances, illustrated by Vinyon in the United States.

This 1939 summary mentioned most of the synthetic fibres used in 1946, at least those in the general commercial market, with the exception of spun glass fibre, which is not synthetic in its nature and is not rayon (cellulose base). Aralac, used during World War II for its woolly appearance, is a natural protein fibre of milk casein.

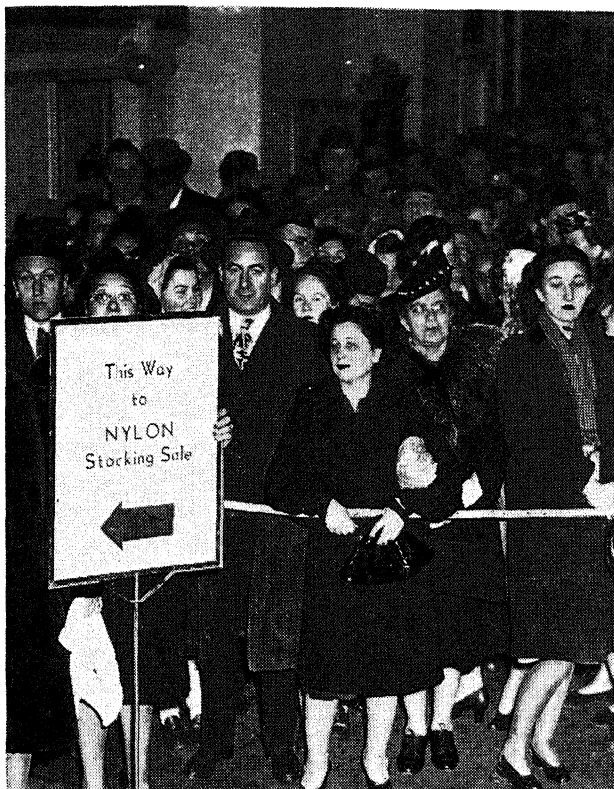
Rayon's World Leadership.—The leadership in rayon production held by Germany from 1937 to 1944 was taken over by the United States, when Germany's total production of 650,000,000 lb. was exceeded by the 723,900,000 lb. from United States plants. Germany's world record of 902,000,000, in 1943, had yet to be equalled, although the United States was rapidly approaching it with 854,000,000 in 1946. Whether Germany would regain its position was not apparent by the end of 1946. During that year, rayon producing in some of the war damaged countries recovered surprisingly. Belgium, Czechoslovakia, France, Great Britain, Italy and the Netherlands showed outstanding gains. Germany and Austria and Japan remained at low levels. But from past experience, most industry men agreed that Germany and Japan presented the most formidable potential competition.

With the beginning of World War II in Sept. 1939, U.S. rayon yarn found its way into the export market to replace the former shipments to South and Central America from Italy, Germany and Japan. Italy continued to maintain its position, especially in Mexico, for the first years of the war, but Germany and Japan were cut off. In the summer of 1940 exports of U.S. yarn, hitherto not called for because of higher prices, were noticeably increasing, especially in rayon staple and waste. In 1937 United States exports of rayon were limited to filament yarn and amounted to 1,281,991 lb. By 1946 the exported yarn totalled more than 19,000,000 lb., of which about 14,900,000 was filament yarn and 4,100,000 staple and waste. Even so, the return to prewar conditions was indicated in the fact that the

Table II.—Filament Rayon Yarn Shipments by Trades
(Millions of pounds)

Year	Knit Goods				Woven Broad	Goods Nar.	Misc. Uses	Total Except Tire	Tire Mfrs.	Total Domestic	Exports	Total Shipments
	Hosiery Fash.	Seaml.	Other Circ.	Warp								
Viscose-Cupra Yarn												
1937	9.7		34.3		141.8	7.2	4.6	197.6	0.9	193.5	0.9	199.4
1938	9.6		34.4		133.4	6.2	3.5	187.1	3.8	190.9	0.9	191.8
1939	12.7			8.5	176.7	8.4	5.1	246.5	8.8	255.3	1.3	256.6
1940	2.9	1.2	37.3	8.2	176.3	7.6	4.6	248.1	9.6	257.7	0.8	258.5
1941	9.4	3.5	36.0	9.0	185.2	10.0	6.7	269.8	18.2	288.0	0.9	288.9
1942	30.3	4.6	32.7	8.2	169.4	8.4	9.4	273.0	28.5	301.5	5.3	306.8
1943	28.4	2.4	29.4	8.1	170.9	10.1	16.5	275.8	55.6	331.4	8.6	340.0
1944	26.6	0.5	28.2	8.3	157.2	12.0	14.3	257.1	115.2	372.3	11.4	383.7
1945	21.2	8.4	27.2	9.2	154.6	13.5	11.1	245.2	187.4	432.6	15.0	447.6
1946	6.0	11.4	31.7	13.4	182.4	12.3	11.3	268.5	214.1	482.6	9.8	492.4
Acetate Yarn												
1937	2.9		4.6		59.8	0.2	0.2	67.7	0	67.7	0.2	67.9
1938	4.5		5.2		72.2	0.4	0.6	82.9	0	82.9	0.5	83.4
1939	3.5		6.3		93.1	0.7	0.7	104.3	0	104.3	0.6	104.9
1940	—	2.3	0.9	7.6	118.5	0.6	1.1	131.0	0	131.0	0.1	131.1
1941	—	3.4	1.5	11.4	145.8	0.2	2.1	164.4	0	164.4	0.4	164.8
1942	1.1	3.4	0.7	14.7	145.7	0.3	1.4	167.3	0	167.3	0.3	167.6
1943	4.7	3.7	0.4	18.2	133.9	0.3	1.6	162.8	0	162.8	0.9	163.7
1944	4.5	3.4	0.8	18.6	137.2	0.5	1.8	166.8	0	166.8	4.9	171.7
1945	2.1	3.7	1.3	19.4	141.2	0.6	1.5	169.8	0	169.8	5.0	174.8
1946	0.1	4.8	1.3	21.7	153.0	0.8	2.1	183.8	0	183.8	2.7	186.5
Total Yarn												
1937	12.6		38.9		201.6	7.4	4.8	265.3	0.9	266.2	1.1	267.3
1938	14.1		39.6		205.6	6.6	4.1	270.0	3.8	273.8	1.4	275.2
1939	16.2		49.9		269.8	9.1	5.8	350.8	8.8	359.6	1.9	361.5
1940	2.9	13.5	38.2	15.8	294.8	8.2	5.7	379.1	9.6	388.7	0.9	389.6
1941	9.4	16.9	37.5	20.4	331.0	10.2	8.8	434.2	18.2	452.4	1.3	453.7
1942	31.4	18.0	33.4	22.9	315.1	8.7	10.8	440.3	28.5	468.8	5.6	474.4
1943	33.1	16.1	29.8	26.3	304.8	10.4	18.1	438.6	55.6	494.2	9.5	503.7
1944	31.1	13.9	29.0	26.9	294.4	12.5	16.1	423.9	115.2	539.1	16.3	555.4
1945	23.3	12.1	28.5	28.6	295.8	14.1	12.6	415.0	187.4	602.4	20.0	622.4
1946	6.1	16.2	33.0	35.1	335.4	13.1	13.4	452.3	214.1	666.4	12.5	678.9

Source: Rayon Organon—published by Textile Economics Bureau Inc.



Huge turnout in response to a department store's announcement offering nylon hosiery for sale in Jan. 1946. By the close of the year, this article was removed from the list of scarce consumers' goods for the first time since the beginning of World War II

1946 exports were lower than 1944 and 1945. The peak year, 1945, saw 26,600,000 lb. of rayon going out of the United States; 22,000,000 of filament yarn and 4,600,000 of staple and waste.

Users of Rayon Yarn.—Distribution of filament rayon yarn in the United States offered a basis of study as to the users of rayon yarn and the development of those uses over the period of 1937–46. In 1937 hosiery manufacturers used 4.6% of the total shipments. Woven fabrics took 77.7%. Tire manufacturers, then only starting their interest in rayon, used only .3%. By 1946 hosiery manufacturers, in spite of consuming twice as much poundage, used only 33% of the total. The woven fabrics used 51.4%, but the tire manufacturers received 31.5%.

The ten-year record of filament rayon yarn shipments by trades (Table II) revealed the sharp jump in use of rayon for fashioned hosiery, brought about by the loss of silk in the summer of 1941. It also disclosed the growth of rayon warp knitted fabrics, beginning in 1940 and continuing through 1946. The rayon tire increased its demands 237% between 1937 and 1946.

Table II also shows the effect of releasing nylon for civilian purposes during 1945 and 1946. Rayon for fashioned hosiery dropped from the high of 33,100,000 lb. in 1943 to 6,100,000 lb. in 1946. This confirmed the objections raised in the summer of 1941 by rayon yarn producers and rayon fabric weavers to the demands by government war agencies that a substantial amount of yarn be taken from the weavers and giv-

en to the hosiery manufacturers. Both groups contended that hosiery makers were not serious users of rayon and would revert to nylon as soon as possible. It was also contended that manufacture of fabrics for clothing was a more essential use than hosiery. In the years of 1942–45, when hosiery demand was high, a decreasing amount was allotted to fabric weavers, despite marked increase in consumer demand for rayon garments of all kinds.

Rayon fabric manufacturers not only had to supply increased amounts of fabric to their regular customers, but to a large group formerly using cotton fabrics, no longer available because of military demands, and to buyers in foreign countries who had never before shown interest in the generally higher cost, higher-priced U.S. rayon textiles. Rayon filament yarn was used for the most essential fabrics, such as linings for men's and boys' clothing. Dress fabrics were made of spun rayon, in which the rayon staple is combed into a yarn in a manner similar to the manufacture of raw cotton into cotton yarn. Rayon fabrics began to assume a place of their own in official statistical records. The use of rayon in fabrics had been so experimental that official census figures published by the U.S. department of commerce prior to 1939 were not considered too exact. Cotton and silk weavers were both using rayon extensively, and in making their reports to the government, there was some confusion as to whether the fabrics should be classed as being of one fibre or another.

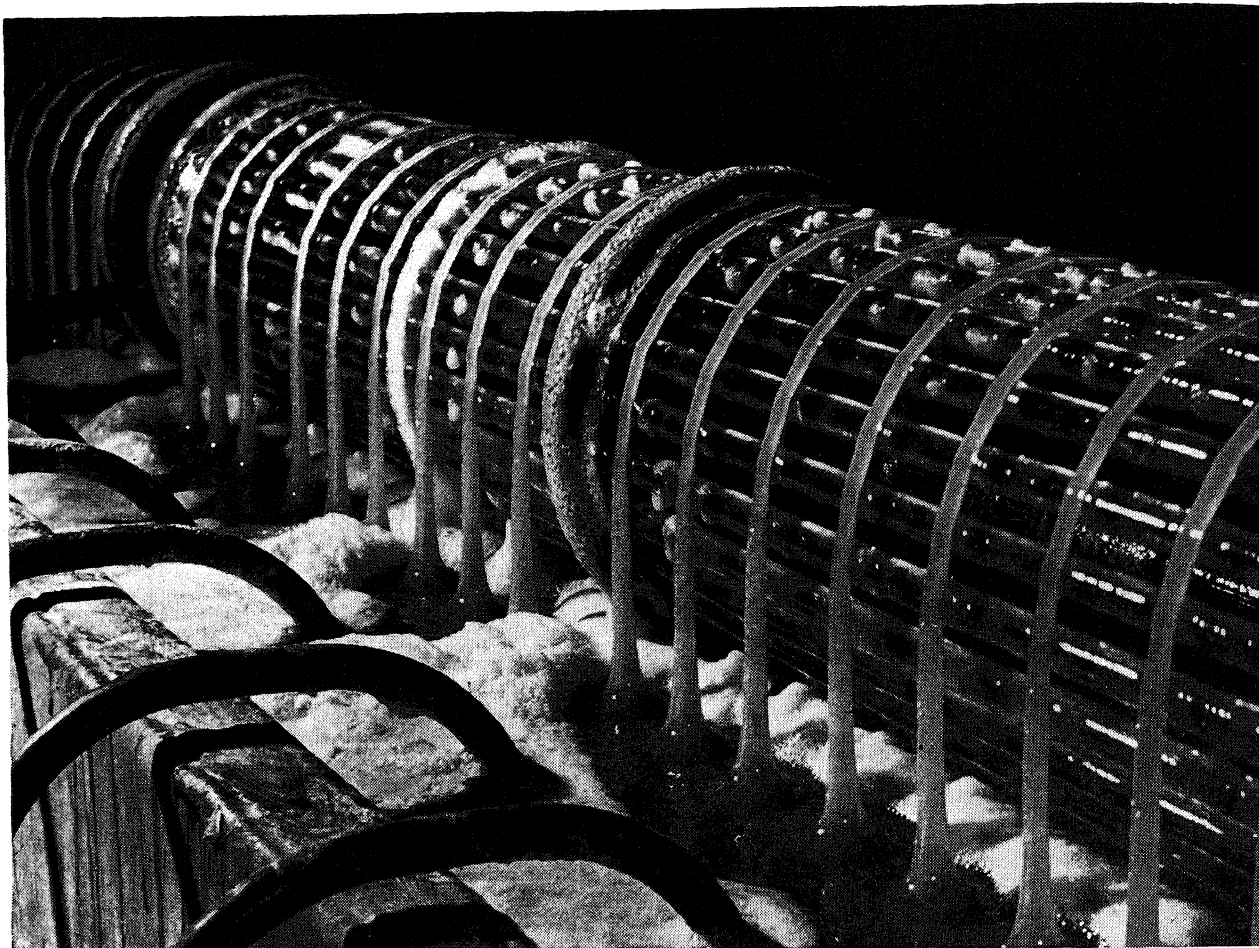
In May 1940 the Textile Economics Bureau Inc., a statistical reporting agency for the rayon industry, published a rayon fabric classification, the first of its kind: 119 fabrics were listed in five groups; filament rayon, filament rayon mixtures, all spun rayon, spun rayon blends with other fibres and spun rayon mixtures. In Aug. 1941 when wartime price controls were first suggested in the United States to protect essential civilian supplies, the basis of the price regulation was a similar classification. Later it was expanded to about 250 fabrics, representing the staple types of rayon fabrics which by 1942 were established on the market.

The War Production board and the Office of Price Administration early authorized the collection of production and shipment statistics in detail from the producers of rayon fabrics to meet the demand for information about the newly developed industry that had not been hitherto available. These reports, first published in 1943, gave production of fabrics by types, consumption of rayon by the mills and later machinery operation in three month periods. A summary of the reports for 1943–46 is shown in Table III, combined with census reports for 1937 and 1939. In addition to the rayon fabrics, the complete reports included nylon, silk and other fabrics, as made in the mills customarily working on rayon. Among them were wool and rayon mixtures, containing less than 51% of rayon. These mixtures were used to eke out the supply of raw

Table III.—Rayon, Nylon and Silk Broad Woven Goods Production in U.S. 1937–46
(Millions of yards)

	1937†	1939	1943*	1944	1945	1946
Rayon broad woven fabrics, Total	1,144.2	1,417.1	1,187.1	1,603.7	1,570.9	1,705.9
100% filament rayon fabrics		998.9	1,099.7	1,098.5	1,029.7	1,045.6
100% spun rayon fabrics		176.6	161.3	151.9	162.0	187.1
Combination filament and spun rayon fabrics		22.7	141.8	153.7	159.6	177.2
Pile, upholstery, drapery and tie fabrics (51% or more rayon by weight)	812.2	22.9	31.7	28.9	31.8	44.9
All other rayon mixtures (51% or more rayon by weight)	54.8	120.1	138.1	160.6	170.6	254.0
Silk, nylon, glass and other fabrics (including mixtures with less than 51% rayon)	142.1	68.7	79.6	84.3	67.7	60.2

*Nine months actual, three months estimated
†Square yards; all others in linear yards.
Source: U.S. bureau of census.



Chemical extracts of casein solution, from skimmed milk—source of aralac, a versatile synthetic fibre. This picture shows aralac being reeled out of the acid bath which changed it from a liquid to a fibre

wool at the beginning of World War II, when military needs were expected to be heavy; but despite later comparative plenty in wool fibre, the new fabrics continued in demand for men's and sports wear. The reports also reflected a shortage of a standard type of rayon, 150 denier pigment yarn, that comprised the bulk of the popular priced dress materials prior to the war. Their disappearance from the market caused a good part of the complaints as to shortages of desirable materials. The production of 150 denier yarn was cut sharply due to the conversion of spinnerets for the coarser yarns to tire yarns, badly needed by the military.

Rayon and Synthetics in the War.—Rayon was the first textile material subject to U.S. civilian allocation during World War II. When commercial relations with Japan were terminated in July 1941, the U.S. government immediately took steps to purchase all available raw silk for whatever military requirements might arise. At that time, silk was the only material used in parachute fabric. Manufacturers of hosiery and fabrics who were still using silk immediately pleaded for help in securing yarn to continue their supplies of civilian necessities. Rayon yarn had been difficult to obtain for some time. Early in July, it was stated that it had become necessary to allot yarn to customers because of the limited supply. On Aug. 2, 1941, the Office of Price Administration (OPA), division of civilian supply, ordered rayon producers to set aside 10% of their daily output and 10% of their stocks for a government pool. The rayon had to be suitable for hosiery and other products formerly made of silk. Hosiery makers were allotted 70% of the pool and other manufacturers the remaining 30%. On Aug. 23, the OPA issued mandatory ceiling prices for 52 constructions of rayon gray goods.

The prices were stated to average 10% less than market quotations, and the ceiling price regulation of rayon gray (unfinished) goods remained in effect until Dec. 1946, with no revisions after April 1942. Some South American countries, the U.S.S.R., South Africa and Australia received export quotas of the rayon yarn by government decree. What was first considered strictly a civilian industry destined to supply civilians with fabrics developed into a war industry of substantial importance and size.

The use of rayon fabrics and materials in military equipment was extremely diversified. Parachutes of all kinds were made of rayon and nylon as well, although the latter was restricted to the escape chute used by air force personnel. Cargo or aerial delivery chutes employed extensively in the Pacific area to reach out-of-the-way posts in jungles and on isolated islands, carried food, supplies and mail. Flare chutes were used for signalling. Luminous satin strips were laid on airfields to guide planes where landing lights were impractical. Marksmanship was practised by aid of tow targets, huge cone-shaped parachutes sometimes made of rayon interlaced with copper wire to keep them rigid in the air. Low-level bombing was made possible by use of the fragmentation bomb parachutes. The bomb was dropped from as low as 25 foot altitudes by the plane; the parachute delayed its action sufficiently to permit escape of the fliers. Many hundreds of thousands of these parachutes were made, and more than 22,000,000 yd. of fabrics were woven for them.

In addition to rayon, synthetics such as nylon and glass fibre were extensively used. Nylon, particularly, was found

of great value in equipment of parachute troops and jungle fighters. Ski troopers were given tents of nylon cloth because of its light weight and strength, and because it could be weather-proofed successfully. Experienced aviators soon preferred nylon to silk personal parachutes. The fibre did not mildew as silk did; it kept cleaner because of its less absorbent properties, and its creases fell out more readily on being repacked. Nylon mosquito bars were impervious to jungle "rot," were more airy, lighter in weight and resistant to moisture and dirt. Sleeping hammocks were also made of nylon cloth for the same reasons, and by the close of World War II, plans were under way to utilize the fibre in many articles of clothing where light weight, ease of cleaning and strength were required.

Glass fibre fabric was fused into body armour for anti-flak suits. It was also used in many instruments for the military. The quartermaster corps of the army became so interested in the possibilities of the synthetic fibres that it retained for peacetime study a corps of technical men working for the duration of the war. A report on the accomplishment of the work was made in 1945 to the textile industry as an example of what technical research could do in manufacturing materials to meet a need rather than a weave.

Nylon was also shipped to Great Britain during World War II. Results of experimentation in weaving the fibre were sent to British weavers for their guidance, and yarn and polymer for making yarn were supplied to the British industry. The British-owned rayon producing organization (largest in the United States)—Viscose corporation—was sold on the U.S. market on March 16, 1941. This was considered a bitter blow to British rayon leadership but the sale was said to be in line with the policy of the British government to sell its investments in the United States for dollar exchange. The corporation was taken over, however, primarily by U.S. associates of the original firm.

The total rayon fabrics supplied for war uses during World War II was approximated at 912,000,000 lin.yd. (See also CHEMISTRY; CHEMURGY.)

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R.D.F. (Radio Detection Finding)

See RADAR.

REA (Rural Electrification Administration)

See RURAL ELECTRIFICATION.

Receipts, Government

See BUDGETS, NATIONAL.

Reciprocal Trade Agreements

See INTERNATIONAL TRADE.

Reclamation

See CANALS AND INLAND WATERWAYS; FLOOD CONTROL; FORESTS; IRRIGATION; SOIL EROSION AND SOIL CONSERVATION.

Reconstruction Finance Corporation

The Reconstruction Finance corporation, created by congress on Jan. 22, 1932, began operations as a lending

agency on Feb. 2, 1932. On June 30, 1946, authorizations for loans and other purposes totalled \$40,557,000,000. In addition, the corporation had outstanding authorizations aggregating \$674,000,000, which were made under conditional agreements.

Capital stock of the corporation was originally fixed at \$500,000,000, all of which was subscribed by the secretary of the treasury on behalf of the government of the United States. Pursuant to the act, approved June 25, 1940, the corporation retired \$175,000,000 of its capital stock at par. The corporation's succession, originally established at ten years, was extended five years to Jan. 22, 1947, and, subsequently, as an interim measure, was again extended by the 79th Congress to June 30, 1947.

Recovery Period, 1936-40.—Starting with 1936 and ending with 1940, when the national defense and war production period began, the United States was undergoing convalescence from the worst depression in its history. During this period the need was recognized of giving special assistance to owners of real estate and holders of real estate mortgages. RFC, while not dealing directly with individual borrowers under federally-insured mortgages, nevertheless assisted them through the creation of a market for such mortgages. Its activities along this line were directed toward creating confidence in real estate and thereby encouraging home building. In addition, a series of floods, hurricanes and other disasters of such magnitude that individual communities could not, themselves, meet the needs of distressed persons in the community, led to the creation of a special organization designed solely for the purpose of aiding disaster victims.

The RFC Mortgage company was formed at a time when practically no mortgage money was available to deserving borrowers to protect their business properties from foreclosure, and to aid in the reorganization of properties covered by excessive mortgages and mortgage bond issues. Congress authorized the corporation in Jan. 1935, to invest in the capital stock of mortgage companies up to \$100,000,000 when any such investment was approved by the president, following which the corporation, with the approval of the president, subscribed for the capital stock of the RFC Mortgage company March 14, 1935, in the amount of \$10,000,000, later increased to \$25,000,000. The stock was all owned by the RFC.

The Federal National Mortgage association was organized by RFC on Feb. 10, 1938, under authority of the National Housing act, which provided for organization of national mortgage associations. Owned and operated by RFC, it was established to deal exclusively with mortgages insured by the Federal Housing administration. It had \$10,000,000 capital, paid-in surplus of \$1,000,000 and, at June 30, 1946, had surplus and reserves aggregating \$2,598,000. It had paid dividends to RFC aggregating \$20,500,000.

Disaster Loan corporation was established following the Ohio river flood in Jan. 1937, when congress, in response to a nationwide desire to assist flood victims, instructed RFC to organize such a corporation with capital up to \$20,000,000 to be used in making loans to those who suffered losses from flood or other catastrophes during 1937. The Act was later amended to include such losses that occurred in the years 1936 and 1938. Offices for making disaster loans were established in cities throughout the Ohio river valley immediately after the corporation was organized, and 7,555 loans, aggregating \$8,805,051, were authorized as a result of the Ohio river flood, of which \$6,785,729 was disbursed. Offices were opened the following year in

numerous New England cities for the purpose of making disaster loans as a result of the hurricane that occurred in Sept. 1938. Effective July 1, 1945, this corporation was dissolved, and its functions, powers, duties and authorities were transferred to the RFC.

War Activities of RFC, 1940-45.—The axis nations, which early in the 1930s had converted their economies to a wartime production basis, had the advantage of a head-start on the nations with which they were later at war. Sensing the gravity of the peril, the United States launched a program in the summer of 1940 designed to strengthen America's military might. As part of this endeavour, congress empowered the Reconstruction Finance corporation to lend its full credit facilities to producers of war goods. An important part of this program had a direct bearing on small business. It became apparent early in the defense and war periods that every available plant capable of engaging in war production should be encouraged to expand its facilities and, where necessary, to re-tool its plant in order that all manufacturers could contribute efficiently to the war effort. This operation affected not only the large suppliers of products needed by the military, as well as the civilian, front of the country, but also tens of thousands of sub-contractors, sub-sub-contractors and other small suppliers. In addition, the Reconstruction Finance corporation was authorized to create new production facilities, to install special-type machinery in privately-owned plants, and to create stockpiles of critical and strategic materials for use in war production.

To enable RFC to perform these functions, the president, on June 25, 1940, signed an act of congress authorizing the corporation to act through subsidiary corporations to be created by it, for purposes of national defense; to build and operate plants and facilities for the manufacture of matériel; to procure supplies and equipment, and to buy materials declared by the president to be strategic and critical. The subsidiaries created under this authority were the Defense Plant corporation, Rubber Reserve company, Metals Reserve company, Defense Supplies corporation, War Damage corporation, U.S. Commercial company and Petroleum Reserves corporation.

Another subsidiary, the Rubber Development corporation, was established under the laws of the state of Delaware.

Defense Plant corporation, Defense Supplies corporation, Metals Reserve Company and Rubber Reserve company were dissolved, effective July 1, 1945, and their functions, powers, duties and authority were transferred to RFC.

Defense Plant corporation was created by the RFC on Aug. 22, 1940, primarily to build and operate plants and facilities for the production of war matériel and to perform other acts essential to the U.S. national defense. The corporation made authorizations totalling \$8,972,000,000 for 2,486 projects. An additional \$2,157,000,000 was authorized for machine tools pool, for the gauge and cutting tool program and for surplus machinery warehouses. Of the aggregate amount of authorizations, \$8,468,000,000 was for the construction and operation of 2,260 facilities for the production of a wide range of products, including steel, magnesium, aluminum, alumina, chemicals, metal fabricating, aviation gasoline, gas storage, synthetic rubber, a tin smelter and floating power plants. Authorizations for 226 nonmanufacturing projects totalled \$504,000,000 and included flying schools, housing, six pipe lines, among them the Big and Little Big-Inch pipe lines.

Both in number of projects and the amount authorized, production of aircraft and parts was the major activity of the Defense Plant corporation, a total of \$3,208,000,000 being authorized for 620 facilities. In many of these, components and accessories were manufactured for assembly or use in repairs elsewhere while in others complete planes were made. DPC's second biggest task was making available facilities for producing the steel and pig iron required to fill wartime needs, the sum of \$1,148,000,000 being authorized for 225 facilities, including those used in the production of coke and ore. Third largest program was the authorization of \$1,056,000,000 for 159 synthetic rubber projects.

Other authorizations and the manufacturing projects for which they were made included: Aluminum, \$842,000,000 for 99 projects; aviation gasoline, \$324,000,000 for 45 projects; chemicals, \$214,000,000 for 199 projects; machine tools, \$91,000,000 for 166 projects; magnesium, \$449,000,000 for 53 projects; minerals, \$178,000,000 for 79 projects; ordnance, \$495,000,000 for 119 projects; radio communication and field equipment, \$120,000,000 for 167 projects; shipbuilding, including propelling machinery and parts, \$201,000,000 for 100 projects; other manufacturing facilities, \$142,000,000 for 229 projects.

Authorizations for 66 flying schools totalled \$46,000,000; for 29 housing projects, \$29,000,000; for 6 pipe lines, \$189,000,000; for 110 transportation projects other than pipe lines, \$234,000,000, and for 15 other nonmanufacturing facilities, \$6,000,000.

Rubber Reserve company was organized by RFC June 28, 1940, for the purpose of acquiring stockpiles of raw rubber and of developing and supervising the operation of facilities for the production of synthetic rubber. In Feb. 1943, at the request of the rubber director, RFC separated the development and procurement of natural rubber in the western hemisphere from Rubber Reserve company and carried on that operation through Rubber Development corporation, another subsidiary of RFC which was transferred on July 15, 1943, to the Office of Economic Warfare, and later transferred to the Foreign Economic administration, where it handled all natural rubber procurement in foreign countries.

Development of the synthetic rubber industry during the war emergency was a credit to the ingenuity and enterprise of U.S. business and was an outstanding example of the close co-operation of industry and government during the emergency. Some small plants for the production of synthetic rubber were first authorized early in 1941. The program was increased to an annual capacity in excess of 400,000 tons immediately after Pearl Harbor and, following the fall of Singapore, it was further increased. Rubber Reserve company's production of synthetic rubber was approximately 1,750,000 long tons, 737,000 tons of which were manufactured in 1944 and 800,000 tons in 1945. Synthetic rubber plants in the United States reached a capacity of at least 1,000,000 long tons of synthetic rubber a year.

Forty-seven chemical, petroleum, rubber and industrial companies were operating plants for Rubber Reserve company in 1946. In addition to the production of synthetic rubber, the plants manufactured 28,400,000 gal. of ethylbenzene and approximately 14,200,000 gal. of cumene used in the manufacture of aviation gasoline.

Including imports by the trade, crude rubber importations from 1940-46 were more than 2,280,000 long tons. Of this the Rubber Reserve company imported 1,051,000 tons of natural rubber, including 90,000 tons bought from the Commodity Credit corporation.

Before the war, natural rubber cost from 18 to 20 cents a pound. Some of the synthetic plants produced rubber at less than those figures. The cost of production, exclusive of plant amortization, was higher in 1944, being approximately 33 cents a pound, because more than 60% of the rubber had to be made from high-priced alcohol instead of petroleum.

Metals Reserve company was created June 28, 1940, to produce, acquire, carry and sell, or otherwise deal in, strategic and critical materials, primarily metals and minerals in connection with the war program, performing these functions until July 1, 1945, when, under Public Law 109, 79th congress, it was consolidated in Reconstruction Finance corporation as the Office of Metals Reserve. The Reconstruction Finance corporation, as of Dec. 31, 1945, had made total commitments for the procurement of strategic and critical minerals and metals aggregating \$6,024,000,000. Of this amount, \$2,762,000,000 had been disbursed and \$2,524,000,000 cancelled or assigned to industry or the Foreign Economic administration. Sales of these materials, made principally to industries engaged in war production, amounted to \$1,793,000,000. Stockpiles on hand cost \$611,105,000 and, in addition, there were assets largely consisting of advances to contractors, other receivables, mining equipment and supplies in the sum of \$98,400,000.

Losses through sale of materials within Office of Price Administration ceiling prices were \$54,400,000, a great many of the materials having been bought at more than ceiling prices. Losses through subsidizing domestic production of copper, lead and zinc from marginal mines and other metal subsidies aggregated \$238,000,000.

Purchases covered 75 different critical materials, and came from 51 foreign countries, 43 states in the United States, Alaska and the Philippines. Purchases were begun in 1940, well before Pearl Harbor, and continued throughout the war. Activities were continued through 1946 to meet civilian deficiencies as estimated by the Civilian Production administration.

Reconstruction Finance corporation, through its Office of Metals Reserve, also operated a tin smelter at Texas City, Texas, and the Nicaro Nickel plant in Cuba, and administered the premium price plan for domestic copper, lead and zinc.

Defense Supplies corporation, created Aug. 29, 1940, to purchase and stockpile strategic and critical materials other than rubber, minerals and metals, and to do other things necessary to the production and procurement of essential materials such as payment of extraordinary transportation costs on oil, coal, and sugar, loans and advances to contractors, was dissolved effective July 1, 1945, under Public Law 109, 79th congress, and was consolidated with the Reconstruction Finance corporation as the Office of Defense Supplies.

As of Dec. 31, 1945, the Reconstruction Finance corporation, through Defense Supplies corporation, had authorized total expenditures in the war effort aggregating \$12,324,000,000, of which \$1,446,000,000 had been cancelled or assumed by private industry. Disbursements for the purchase of strategic and critical materials, extraordinary transportation costs in oil, coal and sugar, loans and advances to contractors in connection with the purchase of materials, the payment of subsidies and other activities made necessary by the war were \$8,156,000,000. Receipts from the sale of materials, repayments of loans and advances and from other sources totalled \$6,122,000,000.

Principal subsidies were those paid on meat, butter, flour, crude oil from stripper wells, aluminum rod and bar,

woodpulp and extraordinary transportation costs. Subsidy payments through Dec. 31, 1945, on meat were approximately \$1,169,000,000; on butter, \$183,000,000; and on flour, \$244,000,000. Subsidy payments on the production of crude oil from stripper wells began Aug. 1, 1944, and total payments through Dec. 31, 1945, were approximately \$68,000,000. As of that date, all claims had not been paid.

Payment of extraordinary transportation costs included the movement of petroleum and petroleum products from the midwestern and the southwestern sections of the United States to the eastern seaboard at a net cost of \$337,700,000; the movement of crude oil from Texas and Louisiana to midwestern refineries at a net cost of \$14,700,000; the transportation of coal by rail to the New York and New England area at an approximate cost of \$49,900,000; and the transportation of sugar from the western section of the United States to the eastern seaboard at an approximate cost of \$24,900,000.

Loans and advances were made principally in connection with the construction of facilities for the production of 100-octane aviation gasoline. The corporation disbursed on loans and advances for this purpose \$130,200,000. Repayments aggregated \$87,000,000.

In addition, the corporation in Sept. 1941, agreed to purchase materials from the soviet union aggregating \$100,000,000, and advanced \$49,700,000 against the future delivery of such materials. As of Dec. 31, 1945, the soviet union had delivered materials on this contract to the value of \$46,000,000, as payment on the advances.

To enable the Army Exchange service to establish post exchanges speedily in all locations where troops were sent, the corporation authorized loans aggregating \$91,000,000, against which disbursements were made in the total amount of \$71,100,000. All of these advances were repaid from operations of the post exchanges.

Other activities of the corporation included the elimination of axis control of Latin-American airlines and bringing citizens of other American republics to the United States for training as aviation pilots and technicians.

An important activity was the operation of the various government-owned pipe lines for the transportation of petroleum and petroleum products. As of Dec. 31, 1945, the corporation had expended \$880,000,000 for the purchase of petroleum and petroleum products and in operating the lines. Receipts from the sale of the oils and operations of the lines totalled \$1,048,000,000. The pipe lines were operated for account of Defense Supplies corporation, and at very substantial profits.

War Damage corporation was organized by Reconstruction Finance corporation on Dec. 13, 1941, to provide governmental insurance against loss of or damage to property as a result of enemy attack. Organization of this subsidiary was necessary because of the uncertainties involved and the inadequacies of insurance reserves. War risk insurance on other than marine risks was practically unobtainable at the outbreak of the war. (See INSURANCE.)

U.S. Commercial company was created March 27, 1942, as a subsidiary of the Reconstruction Finance corporation. An executive order of July 15, 1943, transferred control of the U.S. Commercial company to the Office of Economic Warfare, which on Sept. 25, 1943, was consolidated into the Foreign Economic administration. On Sept. 27, 1945, certain functions handled by FEA through U.S. Commercial company were redistributed to RFC. The company served as the corporate agent of the Foreign Economic administration for the procurement and development of strategic

materials and essential foodstuffs, outside the United States, the operation of certain special projects for the army and navy in war zones, and the facilitating of American trade with areas with which direct commercial dealings were cut off or restricted because of the war.

The executive order which transferred U.S. Commercial company to the Foreign Economic administration provided that Reconstruction Finance corporation should furnish the funds necessary in its operations. RFC authorized loans to U.S. Commercial aggregating \$1,800,000,000, of which \$1,654,512,515 had been disbursed. Repayments totalled \$1,235,160,717. The U.S. Commercial company assisted in the restoration of the economies of occupied areas of Germany and Japan during 1946, and in facilitating trade with those areas as far as practicable.

Petroleum Reserves corporation was established by the Reconstruction Finance corporation on June 30, 1943, principally to buy or otherwise acquire reserves of crude petroleum. On July 15, 1943, it was transferred to the Office of Economic Warfare, and, on Sept. 25, 1943, was consolidated into the Foreign Economic administration. On Sept. 27, 1945, Petroleum Reserves corporation was returned to RFC. On Nov. 9, 1945, its name was changed to War Assets corporation which, until March 25, 1946, was responsible for disposal of surplus property. This corporation was dissolved on June 30, 1946.

In addition to the corporations mentioned above, RFC conducted some of its wartime activities through Rubber Development Corporation and Defense Homes corporation.

Rubber Development corporation, established under the laws of the state of Delaware, was organized to carry on all wartime activities connected with the exploration, development and procurement of crude rubber, balata, cryptostegia, guayule and other gums of similar utility in all areas outside the continental United States for which the United States assumed responsibility. It also engaged in the procurement of liquid latex, scrap rubber and reclaimed rubber and rubber products in foreign countries. On Sept. 25, 1943, the capital stock, including all of the issued and outstanding shares which were held by Reconstruction Finance corporation, was transferred to the control of the administrator of the Foreign Economic administration.

The order transferring Rubber Development to FEA provided that Reconstruction Finance corporation should furnish the funds necessary in its operation. RFC authorized loans to Rubber Development corporation aggregating \$275,000,000, of which \$254,613,554 was disbursed. Repayments from the sale of rubber to Rubber Reserve company have been \$172,497,782. Rubber Development corporation was returned to RFC by an executive order of Sept. 27, 1945.

Defense Homes corporation, established under the laws of Maryland, Oct. 23, 1940, though not a subsidiary of RFC, was managed by the latter until it was consolidated with the National Housing agency Feb. 24, 1942. The corporation was authorized to borrow from the Reconstruction Finance corporation not to exceed \$65,750,000, such borrowings to be repaid from the net income from operation of the properties during the preceding quarter after provision of adequate reserves for depreciation, vacancy losses, and the payment of all expenses and from proceeds of disposition.

The Post-War Period.—The promotion of a sound and enduring prosperity by extending adequate credit to

banking and business, with particular emphasis upon the needs of small business enterprises, became a major postwar objective of RFC. At the same time, the functions of Defense Plant corporation, Defense Supplies corporation, Metals Reserve company and Rubber Reserve company, defense subsidiaries merged into the parent organization July 1, 1945, were continued. Functions of the RFC Mortgage company and of the Federal National Mortgage association also were among major postwar activities of the agency.

RFC from the outset gave special attention to the needs of small business, approximately 90% of all its loans in number being for \$100,000 or less. In preparation for the problems of reconversion, the corporation initiated a nationwide study more than a year before V-J day. The survey revealed that adequate facilities to finance longer-term credit and capital needs of small enterprises were more essential than ever to the success of any prosperity program. This led to the development of the Blanket Participation agreement program, under which RFC agreed to guarantee not exceeding 75% of any business loan made to an eligible business borrower by a participating bank when requested by the bank to do so. Under this plan, RFC committed itself, subject to provisions of the agreement, to take over part of the loan, if the bank desired, upon ten days' notice. Nearly 5,000 banks had signed the agreement as of Sept. 12, 1946. In the event that banks were unable or unwilling to make business loans, RFC continued to accept applications for direct loans; however, applicants were enjoined first to apply to local banks for such assistance.

On June 5, 1946, a small business division was organized by RFC, the function of which was to deal with special small business problems; to develop and co-ordinate advisory services for loan applicants and borrowers; to cooperate with Veterans' administration and the department of commerce in matters pertaining to small business and to assist small business in buying surplus property. During the first six months of 1946, 6,408 business loans in the aggregate amount of \$294,264,549.17 were authorized, of which RFC's participation aggregated \$232,428,032.35. Banks' participations amounted to \$61,836,516.82. These amounts were exclusive of \$119,027,483.49, representing authorizations which RFC took over as a result of the transfer to that agency of certain functions of the Smaller War Plants corporation, as of Jan. 28, 1946.

Under the Surplus Property act, RFC was given authority, formerly exercised by Smaller War Plants corporation, to exercise its priority to buy surplus property for small business, enabling such enterprises to make their purchases after the needs of government agencies and veterans had been satisfied. During the four months ending July 31, 1946, 6,782 applications involving surplus property with an aggregate value of \$27,456,000 were consummated under the RFC priority, and an additional 10,722 applications had been received, many of which were in various stages of consummation.

The postwar functions of the former Defense Plant corporation were marked by orderly liquidation of plants and facilities, and involved contract termination, close-down, plant protection and maintenance, the designation of surplus plants and equipment as being available for disposal, and the continued operation of certain plants under lease agreement. Some 2,260 DPC projects were authorized during the war.

Some programs of the former Defense Supplies corporation were terminated on recommendation of sponsoring agencies, while others were continued. The sum of \$1,000,-

000,000 was included in the 1947 budget for payment of subsidies on flour and meat.

Principal functions of the former Metals Reserve company continued by RFC were the procurement of tin and tin ores and concentrates, copper, lead and antimony under directives from the Civilian Production administration and the Office of War Mobilization and Reconversion.

Because of the short supply, RFC continued to distribute to consumers all available synthetic and natural rubber, the corporation performing the functions previously handled by the Rubber Reserve company, which was dissolved July 1, 1945, and directing activities of the Rubber Development corporation, which was transferred back to RFC on Sept. 27, 1945.

The RFC Mortgage company maintained a market where financial institutions could sell Federal Housing administration insured mortgages to provide cash for making additional loans for other purposes. Since its organization the RFC Mortgage company had disbursed approximately \$353,000,000 for 66,174 mortgages and loans; had sold or collected 58,974 mortgages and loans, totalling \$313,762,000, and as of Dec. 31, 1945, had outstanding 7,200 loans totalling \$39,239,000.

Over \$117,000,000 of the amount disbursed related to war housing.

The RFC Mortgage company also established a market for veterans' home loans guaranteed or insured by the Veterans' administration, thus enabling private financial institutions to continue to make loans to veterans for the purchase or construction of homes.

Operations of the Federal National Mortgage association, created to assist in establishing a market for first mortgages insured under the National Housing act, as amended, were continued during 1946. As of March 31, 1946, the association had disbursed \$271,554,633 for 66,957 mortgages; had sold or collected on 64,552 mortgages totalling \$264,603,995, and as of March 31, 1946, had outstanding 2,405 loans totalling \$6,950,638.

Until March 25, 1946, when the War Assets administration took over, RFC was responsible for the disposal of many items of surplus property. From May 1, 1944, until the close of its program, surplus aircraft and capital and producers' goods costing \$12,912,000,000 was turned over to RFC for disposal. Aircraft costing \$6,904,000,000 accounted for considerably more than half of the total, and more than two-thirds of the planes, costing \$4,652,000,000, consisting principally of combat planes, were nonsalable. Industrial plants and real estate that cost \$3,496,000,000, and capital and producers' goods, such as chemicals, electronic equipment, machinery and miscellaneous items that cost \$2,512,000,000 accounted for the rest of the surplus inventory.

As of March 23, 1946, property that cost \$1,887,000,000, or 14.6% of the total turned over to RFC, had been sold or leased.

The sales record, involving property that cost \$1,328,000,000, showed a yield to the government of \$576,000,000, a return of 43.4 cents on the dollar. The return from industrial plant and real estate sales was 59.6% and from aircraft 16.6% of cost. (C. B. H.)

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Reconversion, Postwar

See BUSINESS REVIEW; WAR PRODUCTION.

Red Cross

American Red Cross.—Supported entirely by voluntary contributions, the Red Cross conducted the most diversified program of its history during the decade ending in 1946. Within that period its primary obligation of assistance to the armed forces expanded to undreamed of proportions, it carried out the largest disaster operation in its history, furnished relief valued at \$178,474,068 to civilian victims of war in some 40 countries and at the same time maintained and expanded its long-standing programs of community service at home.

With the end of World War II, the American Red Cross (ARC) set itself to aiding rehabilitation and reconstruction, to strengthening community programs and to continuing the domestic and overseas program on behalf of the armed services.

In 1941 the organization had 9,866 chapters and branches, supported by 9,190,474 adult and 9,749,053 junior members. At home and overseas on Dec. 7 of that year were 1,087 Red Cross men and women professionally trained to assist men in uniform with the multiplicity of problems which the expansion of the U.S. army and navy brought in its wake. Medical social workers, hospital recreation workers and field directors in camps, supplemented by great numbers of chapter workers in home communities, constituted a closely knit network which provided invaluable assistance in the solution of individual and family problems of citizen soldiers and their dependents.

Continued expansion of the army and navy was reflected in increasing numbers of trained Red Cross personnel serving with the armed forces. By Dec. 1942 the number had increased to 5,000 and on June 30, 1945, six weeks before Japan surrendered, there were 19,508 trained Red Cross professional workers thus occupied.

As the pattern of war unfolded, the program developed. Accompanying troops in all theatres of war were field directors skilled in dealing with men. Seventy-eight Red Cross men and women were killed or died in line of duty overseas.

For the battle-weary and for men on leave, the Red Cross operated clubs, rest homes and recreation centres, such as game rooms and theatres. For the hungry it operated canteens and snack bars which served millions each month. And for the men up front, at isolated airfields and anti-aircraft posts, it operated clubmobiles. Similar to clubmobiles were the so-called trainmobiles in Iran and India which brought entertainment and recreation to the men charged with keeping the rail lines open and the flow of war goods moving.

While clubmobiles provided refreshments without charge, in accordance with a war department request, men staying in the homelike atmosphere of Red Cross clubs in leave areas and rest centres paid a nominal charge for sleeping accommodations and meals. These charges, however, never actually covered costs and, in return, the men had comfortable beds, clean sheets and towels, soap and showers and stateside meals. One of the most famous Red Cross clubs was Rainbow Corner in London, which closed its doors Jan. 8, 1946, after three and one-half years of 24-hr. service, during which more than 18,000,000 servicemen passed through its portals.

At the height of operations the Red Cross had 989 clubs, rest homes and similar installations overseas. As troops moved from one area, establishments were closed, while arrival in a new area signalled opening of new installa-

tions. Most of the 319 clubmobiles operated in Europe and North Africa, as the jungles of Pacific islands were not suited to this service.

In 1946, by agreement with the war department, the latter took over responsibility for operation of Red Cross clubs. Under this arrangement, the Red Cross continued to staff clubs with trained personnel and volunteer workers recruited from among dependents of members of the armed forces overseas, while expenses incident to operation were borne by the war department. As of Oct. 31, 1946, there were 295 such recreation facilities, 128 in the far eastern theatre, 129 in Europe and the Mediterranean area and the remainder in Alaska, Canada, Canal Zone, Puerto Rico, Newfoundland, certain Pacific islands, Greenland, Bermuda, Iceland, Labrador, the Azores and Africa.

At home the Red Cross was equally active on behalf of the armed forces as in the field. In Jan. 1941 the army and navy requested that the Red Cross establish a blood procurement program. Under this project the Red Cross operated blood donor centres in metropolitan areas and provided donors whose blood was processed into dried plasma and, as the program developed, human serum albumin, both used for transfusions. The initial request for 15,000 donations, each sufficient for one plasma unit, was shortly raised to 200,000. Following Pearl Harbor, the service expanded further, weekly donations at one time averaging 100,000. By V-J day, when the project was closed, 13,326,242 donations had been obtained in 35 Red Cross donor centres.

Late in 1945, the armed services returned to the Red Cross 1,250,000 plasma units as surplus for civilian use. This was distributed through state and territorial health departments to physicians and hospitals throughout the nation and was available without charge for the plasma itself to all who needed it. Another postwar development was distribution of gamma globulin, a by-product of the processing of human serum albumin, used in immunizing those exposed to measles and in treating those ill with this disease. Chapters were also authorized to participate in local blood donor programs when requested by recognized medical or health agencies.

Important also was the production of surgical dressings by Red Cross chapter volunteers. For manufacturers to have provided all the surgical dressings needed would have required a large expansion of manufacturing facilities, using manpower and materials vitally needed elsewhere. Because of this the Red Cross was requested to undertake its surgical dressing program. Hundreds of thousands of volunteers turned to chapter workrooms and elsewhere and, at the peak, were making as many as 3,000,000 dressings daily. Total production aggregated the staggering number of 2,481,951,637. In addition they made 61,000,000 sewn and knitted garments for distribution to civilian refugees overseas, members of the armed forces and disaster victims; more than 15,000,000 overseas kit bags, given to men as they embarked; and many other articles.

To provide sufficient nurses for the armed forces the Red Cross recruited 104,500 and referred them to the army and navy. Of these, 70,500 served. To meet the needs of civilian hospitals, it trained 215,495 volunteer nurses' aides who assisted in 2,493 hospitals, clinics and other health agencies.

Working under the supervision of medical authorities in military and naval hospitals were Red Cross professional medical social workers and recreation workers. Entertainment programs were staged by trained workers; patient participation in orchestras, theatricals, handicraft programs

and other entertainment was always stressed, but not to the exclusion of outside talent. Motion-picture programs showed the latest features an average of thrice weekly in military hospitals in the U.S. In addition to shows in recreation halls, portable projectors were taken to the wards. Up to June 30, 1946, attendance totalled 50,000,000.

Assisting professional Red Cross hospital workers in the U.S. were many trained volunteers. Members of the Hospital and Recreation corps read and wrote letters for patients, played games with them and helped stage parties at which the Red Cross Canteen corps served refreshments. They distributed books, magazines and comfort articles and in other ways helped patients to recovery. The Arts and Skills corps, composed of craftsmen accomplished in every form of artistry, taught classes in leather working, jewellery making, clay modelling, photography, painting and other subjects.

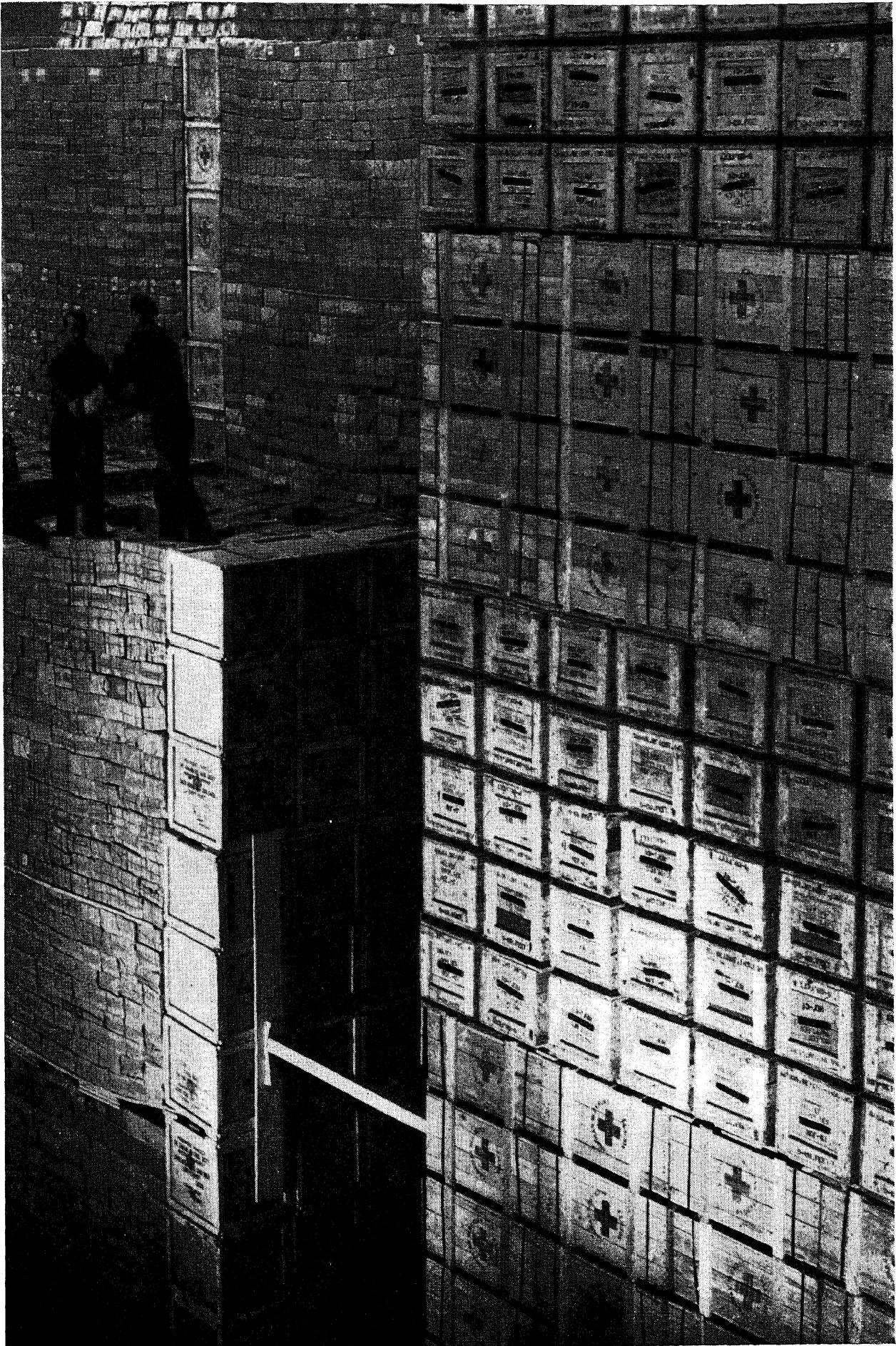
At the peak of activity, more than 3,800,000 chapter workers were enrolled in Red Cross Volunteer Special Services. In the seven years ending June 30, 1946, these volunteers contributed 978,125,929 hours of service. At the end of World War II, the following organized corps were in existence: Production, Staff Assistance, Canteen, Motor, Hospital and Recreation, Arts and Skills, Nurse's Aides, Dietitian's Aides (discontinued June 30, 1946), Home Service and Administration. In addition to duties of corps already described, Staff Assistance members performed office work necessary to keep the chapter functioning smoothly; the Canteen corps and Canteen Aides, besides working in hospitals, served at air strips, outlying posts and often on special occasions; Dietitian's Aides served in hospitals; Motor corps provided transportation for the hospitalized, for crippled children and for the chapter itself; Administration corps members directed the chapter program. Home Service corps, throughout the war, kept in touch with families of servicemen, helping with their problems. In the seven-year period ending June 30, 1946, these workers gave assistance in 17,980,000 cases.

With fighting over and the ranks of veterans swelling as never before, Red Cross volunteers expanded their programs to serve needs of ex-servicemen. To co-ordinate their activities at Veterans' administration hospitals, resident Red Cross field directors were serving in 101 such establishments during the latter half of 1946. For able-bodied veterans and dependents, chapter Home Service workers helped readjust to civilian life, aided with financial problems, advised concerning government benefits legally due them and assisted in the preparation of claims for such benefits. During the fiscal year ending June 30, 1946, Red Cross chapters financially assisted more than 161,000 veterans or their dependents.

Trained Red Cross claims service representatives at regional and other offices of the Veterans' administration assisted in filing and prosecuting claims when authorized by the veteran to do so.

Also providing for men in veterans' hospitals and those of the army and navy was Red Cross Community Service to Camps and Hospitals. Organized early in the war as Red Cross Camp and Hospital Council Service, this activity co-ordinated work of all groups and individuals in communities near camps and hospitals who desired to contribute to the welfare of men at these establishments. Requests channelled from commanding officers through

Ceiling-high stores of P.O.W. packages at one of many warehouses in neutral Switzerland used by the American Red Cross during World War II



councils to groups and individuals resulted in providing complete furnishings for 12,000 sun and day rooms, in addition to games, athletic, music and other equipment. On June 30, 1945, 223 councils and independent committees were serving 3,219 army and navy establishments and itinerant stations. More than 52,000 church groups, labour unions, fraternal orders and similar bodies through councils supplied 79,000,000 articles, from pets to golf courses.

No record of Red Cross war services would be complete without reference to what was done on behalf of prisoners of war. More than 27,000,000 food parcels, packed at Red Cross centres by volunteers, were shipped to Geneva. Thence they were distributed under auspices of the International Red Cross committee to American and Allied prisoners in axis hands. Consignments also went to the far east. Medical chests and other supplies went forward, and in anticipation of the day when prisoners would be liberated, stock piles of comfort kits containing razors, dentifrices and other articles were built up.

The Red Cross was ready to lend assistance shortly after the outbreak of war in Europe in Sept. 1939. As winter progressed, heavy clothing and other supplies went to the Red Cross societies of Rumania, Hungary, Latvia, Lithuania and other countries to help care for thousands of Poles who sought safety within their borders.

As to Poland proper, by agreement with the government general after personal inspection by an ARC delegation which travelled the length and breadth of Poland, relief was provided the stricken population. This was distributed by the Polish Red Cross and other local agencies without regard to race or creed. With Italy's entry into the war, this arrangement ceased, supplies shipped standing at approximately \$1,000,000. As war engulfed Finland, Norway, the Netherlands, Belgium, Luxembourg and France, the ARC appealed to the people for a relief fund of \$10,000,000, which a generous public soon swelled to \$22,000,000. In the same year, 1940, congress appropriated \$50,000,000, and the following year \$35,000,000 for relief "of men, women and children . . . driven from their homes or otherwise rendered sick or destitute by hostilities or invasion." The president was authorized to select agencies for distribution of this relief, and at his request the Red Cross distributed supplies purchased by government agencies.

Even while the \$22,000,000 fund was being raised, the first of several ships was chartered by the Red Cross, loaded with food, medicines and clothing, and dispatched from New York city to France, where supplies were distributed in the unoccupied area under ARC supervision. Until Nov. 1942, when the whole of France was occupied, the Red Cross continued its program, the total representing approximately \$6,000,000 in supplies.

To make relief most effective, the Red Cross applied its resources largely to selected emergency needs not met by other agencies. Only where guarantees were received that supplies would reach recipients without cost and without discrimination as to race, creed or political opinion, were relief programs undertaken. Even so, an essential proviso was that ARC representatives supervise distribution. Actual distribution in almost every case was handled through local organizations, usually the national Red Cross society. This method made possible extensive programs in many countries with limited supervisory personnel and put to use the knowledge and experience of organizations familiar with local conditions. In this process also, local agencies were strengthened and placed in better position to assist their people when the ARC program terminated.

As the war spread, ARC assistance to civilians increased. Clothing, medical and hospital supplies were sent to Great Britain. In 14 countries of the middle east from Iran to Libya, and from Egypt to southern Rhodesia, supplies valued at approximately \$3,800,000 were distributed. Bombed and destitute civilians, including 50,000 Poles in East Africa, were provided with supplemental food, clothing, medicines and sanitary supplies. Relief for civilians in Iceland, Cape Verde Islands, Portugal, Spain and Switzerland sent by and through the ARC totalled more than \$3,250,000.

To assist the soviet people, a relief program began in Sept. 1941. About \$27,000,000 worth of supplies, largely purchased by U.S. government agencies with funds from congressional appropriations, was thus distributed. Throughout the war and after, medical and other supplies went to the Chinese people. This program approximated \$10,000,000 in value, of which \$4,000,000 was flown into China from India at the height of hostilities; half that amount was delivered after fighting stopped.

As Allied armies advanced, ARC relief workers followed in their wake. With the liberation of country after country in Europe, supplementary assistance was provided to the freed populations. Milk feeding programs by which hundreds of thousands of school children received an extra half pint of milk daily were instituted. Clothing, shoes and medical supplies were distributed and several million parcels, each containing eight pounds of food originally intended for prisoners of war but declared surplus at war's end, were distributed to individuals in hospitals, institutions and displaced persons camps. Countries in Europe benefiting from postwar programs included France, Belgium, Luxembourg, the Netherlands, Norway, Finland, Greece, Poland, Yugoslavia, Czechoslovakia, Albania, Italy, Austria and Germany, where the program was largely confined to displaced persons.

The Red Cross program in the Philippines included the general civilian population, released prisoners of war and civilian internees. Following liberation the ARC sent relief supplies valued at more than \$2,000,000 to the islands. With granting of independence to the island commonwealth, ARC representatives assisted in the reconstitution of the Philippine Red Cross, formerly a chapter of the ARC, and its development into an independent society.

Supplies shipped by the Red Cross in its world-wide relief programs included complete hospital units, X-ray materials, equipment for production of blood plasma and penicillin and large quantities of soap. About 250 motor vehicles, many to make distribution of relief possible, were sent. Also included were powdered and canned milk, vitamins and other concentrates and some 41,000,000 garments made by Red Cross chapter workers.

Despite its global activities, the ARC did not slacken its domestic services. By 1937 it had developed a disaster assistance program, the roots of which were buried deep in the silt of the Ohio-Mississippi valley floods of the 1880s and the ashes of the Michigan forest fire of 1881. The 108 domestic disasters in which it gave aid during 1935-36 proved but a prelude to the Ohio-Mississippi valley flood of Jan. 1937—the greatest single flood disaster in ARC history—affecting 196 counties in 12 states. Contributions of more than \$25,000,000 flowed in to the Red Cross, enabling it to function effectively during the emergency and subsequently help refugees resume normal life. More than 1,000,000 persons received Red Cross assistance during this operation, including 97,247 families that required substantial rehabilitation aid.

During the ten-year period 1937-46, the Red Cross gave

assistance in 1,778 disasters. The number of persons assisted totalled 2,272,626 and disaster relief expenditures amounted to \$42,605,763. Disaster nurse recruitment was stressed; an outstanding accomplishment of this service was the recruitment of more than 2,000 nurses to serve in polio outbreaks during the summer of 1946.

The decade also saw intensification of other Red Cross community services. In the five months preceding Pearl Harbor the organization trained and qualified an average of 47,000 first aiders monthly. The next 14 months piled up a total of 5,500,000 certificates issued. Total number of persons trained during the decade ending June 30, 1946, aggregated 9,709,293. Instruction in swimming and water safety resulted in 3,591,069 certificates being issued during the period, while the accident prevention program was developed to the point where this Red Cross activity was well recognized.

To help offset the shortage of nurses, the Red Cross Nursing Service throughout the war emphasized particularly its long-established program of home nursing instruction. During the decade 1,872,925 men, women and young people successfully completed the course. In the field of nutrition, although the Red Cross had a well-developed program dating from the '20s, efforts were redoubled.

The American Junior Red Cross, which in 1946 numbered just less than 20,000,000 members, carried on a far-reaching program of service to members of the armed forces, to young people abroad and to their own communities. They made clothing for youngsters of war-torn lands; furnished millions of articles, games, furniture, canes and similar items, to men in camps and hospitals, and sent 1,400,000 gift boxes, each containing approximately 12 articles, to children overseas. From their National Children's fund, made up of their own contributions, they provided equipment to care for war orphans and evacuees; and, as liberation progressed, they sent large quantities of school supplies to children abroad to speed educational rehabilitation.

Consolidation of health-related Red Cross activities was effected early in 1946 under a newly-created Office for Health Services, which administered the disaster medical service and the blood donor, first aid, water safety, accident prevention, home nursing and nutrition work of the organization.

Contributions in annual Red Cross fund campaigns after Pearl Harbor aggregated \$789,151,800, including the organization's largest peacetime fund appeal, made in March 1946. The goal of \$100,000,000 was oversubscribed by total contributions of \$119,000,000. In the international field, the ARC during 1946 shifted emphasis from providing civilian relief to large masses of population, to strengthening national Red Cross societies so they might better cope with problems of relief.

At the close of 1946, the ARC comprised 3,754 chapters with 5,314 branches and an adult membership of more than 21,000,000. (H. BM.)

World-wide Activities.—The years between 1937-46 brought to the world-wide Red Cross organization disrupting pressures similar to those affecting governments but, at the same time, they afforded opportunities for humanitarian service by Red Cross organizations beyond any other decade in their 80-year history. The efforts of national Red Cross societies and their international organizations to meet the challenge of broad-scale human suffering during these years brought added prestige to the Red Cross throughout the world.

The war in Spain as the decade opened offered a prototype of both the disintegrating pressures and the opportu-

nities for service. Reflecting the split in the government, the Spanish Red Cross was divided into two organizations, both carrying on Red Cross services on their respective sides of the battle lines. On the other hand, through the International Red Cross committee, help from Red Cross organizations outside of Spain and from other agencies was administered to the victims of that war. The total outside relief administered in Spain by the International committee was valued at approximately \$450,000, divided practically equally between the two sides.

When war struck in China in 1937, Red Cross societies made substantial contributions to Chinese relief. The Chinese Red Cross was not a strong society, and much of the relief was administered through committees organized for that purpose in China. As the war continued, the Chinese Red Cross became more closely integrated with the medical service of the Chinese army and near the end of the conflict was operating 60 mobile medical teams. Plans for the reorganization of the Chinese Red Cross designed to strengthen the national organization and carry through a wider program of civilian service were underway in 1946.

Late in the 1930s, Hitler abolished the Junior Red Cross in Germany as Mussolini had done earlier in Italy. The adult Red Cross organizations in both countries directed their programs to services designed to supplement the medical services of the armies and, particularly in Germany, to assist in caring for wartime civilian casualties. Nursing services and training were intensified, and training programs for first aid to the wounded were promoted. During the war, the Red Cross societies in both Germany and Italy trained nurses, operated ambulance and hospital units and provided medical supplies and personnel to supplement the armies' resources. In addition, they operated information bureaus for prisoners of war, cared for civilian homeless and handled messages and inquiries for the civilian population. In 1943 and 1944, units of the Italian Red Cross in Allied territory aided Allied military government in meeting the health and welfare needs of civilians. A demilitarized Italian Red Cross was functioning throughout Italy and expanding its civilian services at the end of 1946. The German Red Cross, however, had been dissolved as a national organization in May 1945, although units were subsequently permitted to function on the *Land* level in the U.S., British and French zones.

The complete occupation of Poland by Germany and the U.S.S.R. in 1939 and the establishment of a Polish government-in-exile provided another manifestation of the disrupting forces affecting Red Cross organizations during the war years. Remnants of the Polish Red Cross continued to function in Poland, furnishing relief to the civilian population, operating hospitals and clinics and handling messages and inquiries. Within a short time, however, there was established in connection with the Polish government in London a Polish Red Cross committee directing particular attention to Polish refugees outside the occupied area. This pattern of split Red Cross organizations characterized other occupied nations; e.g., Yugoslavia, Greece, France, Norway and the Netherlands. In 1945, committees of the Red Cross societies of the Baltic states came into existence in western Europe, working on behalf of refugees from Lithuania, Latvia and Estonia, whereas the national Red Cross societies in those countries were considered by the soviet authorities as having been incorporated into the national Red Cross and Red Crescent¹

¹In Moslem countries, voluntary organizations formed under the terms of the Geneva Red Cross convention became known as Red Crescent rather than Red Cross societies. In Iran, the society was named the Red Lion and Sun.

organization of the soviet union.

The Union of Red Cross and Red Crescent Societies of the U.S.S.R., a federation of the societies in the various republics of that nation, worked closely with the commissariat of public health throughout the war period. In addition to the training of teams to care for the civilian and military wounded, the organization operated civilian hospitals, orphanages and homes for the blind. It rapidly expanded its nursing service and embarked, late in 1944, on an extensive civilian public health program, establishing 10,000 nursing centres in the devastated areas of the western U.S.S.R. The organization served as the principal agency in the soviet union to receive and distribute relief sent to the U.S.S.R. by foreign agencies.

The British Red Cross, at the outbreak of the war in 1939, formed together with the Order of St. John of Jerusalem a war organization to conduct Red Cross activities. During the air raids and robot bombings, the organization operated first aid stations and furnished medical supplies and equipment for the treatment of casualties. In addition to carrying out other traditional services of the Red Cross, the British Red Cross organized relief for British (and empire) prisoners of war and sent through the International Red Cross committee large shipments of food, clothing and medical supplies for prisoners of war. The Red Cross societies of the other parts of the empire similarly made substantial contributions for the relief of prisoners of war. Most of the food packages made available during the last years of the war were packed by the Canadian and American Red Cross societies, whose volunteers worked long hours on factory-type assembly lines in packing plants to prepare the parcels distributed to Allied prisoners in Europe and the far east. The programs of the Red Cross societies in Australia, New Zealand, the Union of South Africa and Canada included not only health and related services to their own populations, but also extensive assistance to civilian war victims in England and in other war-torn countries.

In the far east, the end of 1946 found the Japanese Red Cross refocusing its program under the direction of the occupying forces with the advice of representatives of the ARC. In the U.S. zone of Korea, a newly formed Korean Red Cross had replaced the branch of the Japanese Red Cross formerly established there. American Red Cross representatives were assisting military government in this and related tasks. The chapter of the ARC in the Philippines was progressing rapidly toward independent status as a national Red Cross society for the islands. As for the American Red Cross itself, the war years brought the greatest expansion in its history (see above).

The activities of all of the 61 Red Cross and Red Crescent societies of the world reflected the war conditions of the period. The societies of neutral nations such as Switzerland, Sweden and Eire (formed in 1938) engaged in extensive foreign relief work and in the care of refugees in their countries.

The League of Red Cross Societies, a federation of the Red Cross and Red Crescent societies of the world, continued during the war period to serve as a clearinghouse for information among the societies and helped promote Red Cross service programs. A convention of Red Cross societies called by the league at Oxford, Eng., in July 1946, helped formulate continuing national and international programs for Red Cross organizations.

The International Red Cross committee—an independent organization of 25 Swiss citizens established in 1863,

and recognized by governments as a neutral humanitarian agency—performed throughout the decade many diverse services on behalf of prisoners and civilians. In addition to its help to war prisoners (see PRISONERS OF WAR), the committee handled approximately 24,000,000 civilian messages (through July 1946), joined with the League of Red Cross Societies in the distribution of relief supplies to civilians through their Joint Relief commission, and generally endeavoured to keep alive humanitarian concepts in a world torn by war.

Only one International Red Cross conference—scheduled every four years to bring together the national societies, their international organizations and representatives of governments—was held during the decade. It was held in London in 1938. The 1942 and 1946 conferences could not be convened. Plans were initiated in 1946 to have the next meeting at Stockholm, Sweden, in 1948.

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Reece, Brazilla Carroll

Reece (1889–), U.S. politician and lawyer, was born Dec. 22, 1889, in Butler, Tenn. The son of a farmer, he was one of 13 children. He was graduated from Carson and Newman college in Tennessee with a B.A. degree (1914); he also studied at New York university, where he received his M.A. degree in 1916. He enlisted in the U.S. army in May 1917, won a commission and rose to battalion commander in the A.E.F. Cited for heroism in action, he won the distinguished service medal, the distinguished service cross and the croix de guerre (with palm). After studying at the University of London (1918–19), he returned to the U.S., becoming instructor of economics at New York university. He left after one term, however, to run for the U.S. house of representatives as Republican candidate from Tennessee (first district).

Elected to congress in 1920, he served until 1946, save for the 1931–33 term when he was defeated. A consistent opponent of the New Deal administration's domestic and foreign policy, he was selected as chairman of the Republican national committee on April 1, 1946. His victory was hailed as a triumph for midwest Republicans over Stassen proponents in the G.O.P. He resigned his seat in congress to take up his new post.

Reed, Stanley Forman

Reed (1884–), U.S. jurist, was born Dec. 31, 1884, in Mason county, Ky. He was graduated from Kentucky Wesleyan college with an A.B. degree (1902) and from Yale university (1906). After studying law at the University of Virginia, Columbia university and the Université de Paris, he returned to Kentucky, practising in Maysville and Ashland (1910–29). In 1929 Pres. Hoover appointed him general counsel of the old Federal Farm board, a post he held until 1932, when the president transferred him to the Reconstruction Finance corporation in the same capacity.

In March 1935 Pres. Roosevelt named Reed solicitor general of the U.S., and on Jan. 15, 1938, the president appointed him to the supreme court as associate justice. This appointment was unique in that it received publicly voiced approval from spokesmen of both major political parties. He was sworn in Jan. 31, 1938. Justice Reed gen-

erally voted with the court's liberal majority and in 1944, he wrote the majority decision, announced April 3, that Negroes could not be barred from voting in the Texas Democratic primaries, rejecting the thesis that political parties were private associations and therefore exempt from constitutional regulation.

Reforestation

See FORESTS.

Reformed Church

See PRESBYTERIAN CHURCH.

Refrigeration Treatment (Cancer)

See MEDICINE.

Refugees

See DISPLACED PERSONS; UNITED NATIONS.

Refugees, Intergovernmental Committee on

See INTERNATIONAL ORGANIZATIONS.

Rehabilitation of the Disabled

Paradoxical as it seems, war brings mankind certain benefits. This was graphically illustrated during World War II by the rapid advances made in the fields of physical medicine, occupational therapy and rehabilitation. Early in World War II, a leading orthopaedist predicted that whereas World War I had advanced orthopaedics as a recognized specialty, World War II would do likewise for physical medicine. A survey of the advances made in physical medicine indicates that this prediction was fulfilled. Not only had the war years brought new technological advances and treatment techniques; they had seen the development of an almost entirely new philosophy in the use of physical medicine and occupational therapy.

Prior to World War II, physical medicine and occupational therapy were thought of by most practitioners as specific procedures designed to restore function or strength to specific afflicted parts. When a patient was admitted to the hospital for a leg fracture, treatment was too often confined solely to the injured leg with little regard for the over-all physical or psychological condition of the patient. The injured leg healed, but the general physical condition of the patient deteriorated. He was restless and frequently excessively bored with the routine and inanity of hospital life.

This situation was particularly acute in military hospitals at the outset of World War II. In order to convert hitherto wasted convalescent time into useful, purposeful activity, the military services inaugurated convalescent programs designed to send the soldier-patient back to military duty in the best possible physical condition in the shortest possible time and to give him instruction which would make him a more effective fighting man. Physical activity and military education became as much a doctor's prescription as drugs and diet. Muscles were not permitted to atrophy, for reconditioning and physical therapy started the moment the acute illness of surgery terminated. Minds did not become stagnant, for time was spent purposefully. Hospitals were transformed into a combination gymnasium, school room, machine shop and summer recreation camp.

The emphasis in these programs was placed on functional training. Beading looms and fancy work were replaced by carburetors, radio equipment and engine parts. Men practised radio code while in bed. Military training aids, visual aids and handicrafts along with model aero-



Machine shop at the Birmingham General hospital, Van Nuys, Calif., in 1944, where convalescent veterans were being prepared to find a place in civilian life. These men received compensation on an off-duty basis during the retraining program

planes, tanks, ships and camouflage nets were educational as well as therapeutic devices. The tools of war and industry were substituted for the basketwork type of diversional occupational therapy.

To meet the needs of combat veterans suffering from serious physical and psychological wounds, special convalescent hospitals were activated where rehabilitation programs could be broadened to meet the needs of the "whole man," whatever they might be. Intensive programs of physical reconditioning, educational training, psychological readjustment, resocialization and vocational guidance were tailored to meet the needs of each man as an individual. This philosophy was to "treat men, not diseases."

Special programs were established in military hospitals for particular disabilities. Major amputation cases were not only given physical and occupational therapy to toughen stumps, increase circulation and prevent atrophy and limitation of motion, but were taught to use their prosthetic devices. Self-care particularly was stressed in order that artificial arms and legs could be used effectively. Men were taught to apply and remove their own appliances, climb in and out of automobiles and busses, drive specially fitted or stock model automobiles, remove coins from a purse, unlock doors, dress themselves and relearn the thousands of simple tasks necessary to carry on daily life. It was recognized that fitting a man with an artificial appliance represented only one part of treatment, and that training the individual to use the appliance efficiently was equally important.

Extensive research programs were started with engineers, orthopaedists, limbmakers and technicians pooling their knowledge to attempt to improve the design and function of artificial appliances. Real improvements on both artificial arms and legs were made.

Particularly dramatic were the advances made in the care and treatment of men suffering from spinal cord injuries which left them paralyzed in the lower extremities. Although there were notable exceptions, the life expectancy of such victims previously had averaged about two years. Practically all cases were bedfast or confined to wheelchairs. Death usually came from some type of infection, ordinarily of the kidneys. With the discovery of sulfa drugs, penicillin and streptomycin, infections could be controlled. It was estimated that 80% of the 2,300 U.S. cases resulting from World War II learned or were learning to live independent lives with their braces and crutches. Trained by physical and occupational therapists, they learned to apply and remove their own braces, get in and out of bed, dress themselves, climb stairs, get up and down curbs, cross streets within the time of the traffic lights and take care of their personal needs.

Occupational therapy, particularly, played an important role in the special centres which the military services established for the blind. In these centres, emphasis was placed on independence, self-care, the ability to travel alone, development of confidence, vocational guidance and prevocational training.

Both physical and occupational therapy were an integral part of the treatment of neuropsychiatric patients. Physical reconditioning, recreational therapy, athletics, handicrafts and educational activities were used as adjunctives to definite psychiatric care. Supplementing individual and group psychotherapy, such activities aided patients in regaining lost perspectives and confidence and re-establishing desirable attitudes, habits and values. Physical therapy through exercise, continuous flow baths and wet packs was widely used with psychotic patients.

In some military hospitals, industrial therapy projects were started whereby patients while still hospitalized were able to spend a portion of each day doing piece work and

Men of the U.S. army air forces harvesting rhubarb in 1944 while convalescing at a hospital in Pawling, N.Y. Work on the hospital's 700 acres of land was volunteered by patients, 90% of whom returned to active duty



subassembly work for near-by industrial plants and receiving pay for their efforts. In the majority of hospitals, however, work therapy was limited to clerical work, food services, ward duties and maintenance work for the hospital itself. "On the job" training for a limited number of hours each day provided vocational training in both military and civilian skills as well as short work experiences which could be used in determining interest and aptitudes for vocational guidance. Definite plans were made by the military services to make the wartime innovations in physical medicine, occupational therapy and rehabilitation a permanent part of the peacetime military hospitalization programs.

The philosophy, concepts and many of the techniques developed by the military services were carried over into the hospitals caring for veterans. Although veterans' hospitals had both physical and occupational therapy prior to World War II, such programs were very limited. In some cases, occupational therapy was conducted for the benefit of the hospital rather than the patient. Men shovelled coal, cut grass and repaired furniture. This was known as "work therapy," but the primary emphasis was on the "work" with not too much regard for the "therapy." Such hospitals now provided well-rounded programs of physical and occupational therapy, physical rehabilitation, vocational training and education, with special divisions for patients with spinal cord injuries, blind patients and those who had suffered hearing losses. Staffs composed of physical medicine specialists, physical therapists, occupational therapists, physical educators and teachers were assigned to all hospitals. The purpose of the programs was to bridge the gap between the bed and the job by keeping the rehabilitation process continuous and uninterrupted from the time the man was wounded or injured until he was able to return to society as a self-sustaining citizen.

Added impetus to the field of physical medicine and occupational therapy during the war years came from the Baruch Committee on Physical Medicine, established in 1944 in the United States to further research and training in this field. Financial grants were made by the committee to establish three major physical medicine centres. One of the centres was to be a model in which all phases of physical medicine, including physical and occupational therapy, electronics, hydrology, climatology, manipulative procedures and physical rehabilitation could be developed. Another centre was to specialize in hydrology, climatology and spa therapy with the third devoting its major attention to the preventative and manipulative aspects of the structural mechanics of the body. Other projects included research in electronics and biophysics, the psychologic aspects of physical medicine, structural effects of changes of temperature on the neuromuscular apparatus, the effectiveness of thermogenic agents on deep tissues and similar technical studies.

The committee provided a number of fellowships in physical medicine and made studies translating the rehabilitation experience of the military services into its applications for civilian use.

The utilization of the science of physics therapeutically previously had been minimal as compared with the use of the science of chemistry. This was largely caused by the fact that physical medicine is usually nonspecific in action; it helps the patient recover, but is most often an adjunctive rather than a primary agent of treatment. The development of new diagnostic devices such as the electronic stethoscope, the electro-encephalograph and the psychogalvanic reflexometer and the new therapeutic devices of microwave high frequency apparatus, electric shock therapy equipment and apparatus for electronarcosis opened new



Pottery work, in a Red Cross workshop, by a convalescent soldier at the Halloran General hospital, Staten Island, N.Y.

vistas for the physiatrists—the designation adopted in the United States to describe the physician specializing in physical medicine. The links between general medical treatment and physical medicine were strengthened by clinical work in fever-chemotherapy and in ion transfer.

There was little doubt that in the development of atomic energy for peacetime use, one of its most significant contributions would be in the field of physical medicine. During World War II the newer concepts of physical medicine, occupational therapy and rehabilitation saw the art of medicine welded inextricably to the science. Technological strides provided new diagnostic and treatment measures, but the basic law of good medicine itself had a renaissance of equal importance. Scientific advances were made without sacrificing the ideal that in physical medicine the doctor should treat patients as well as diseases. The basis for such care was not only diagnosis and treatment, but development by the patient of his own potentialities. (See also MILITARY MEDICINE; PSYCHIATRY.)

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Reichenau, Walter von

Reichenau (1884-1942?), Germany army officer, was born in Karlsruhe, son of an army general. He joined an artillery unit in 1903. During World War I, he served on the German general staff and in the early days of the nazi

regime was regarded as one of Hitler's favourites. He was raised to the rank of a lieutenant general during the Polish campaign in 1939 and was made a field marshal in July 1940 in recognition of his generalship in the French campaign a month earlier. Marshal von Reichenau was in command of the army that scored initial successes against Marshal Budenny's soviet forces in the Ukraine campaign in the fall of 1941. In Nov. 1941, however, his armies met defeat at the hands of Marshal Timoshenko and he was driven out of Rostov. A Berne dispatch of Jan. 17, 1942, said Marshal von Reichenau had died of apoplexy while travelling back to Germany "for reasons of health."

Relay Racing

See TRACK AND FIELD SPORTS.

Relief

During the decade 1937-46, the entire field of relief entirely reversed itself, from measures designed to grapple with the widespread spectre of unemployment which had terrified the world during the 1930s, to its entire disappearance in 1940, not by reason of any of the measures taken to handle it, but because World War II absorbed all available manpower and created a deficit of workers in place of the deficit of jobs which had prevailed. Relief, once more, was demonstrated to be a mitigation but not a treatment, much less a cure of the evil of unemployment.

Unemployment.—Comprehensive plans for handling the problems of unemployment by means of relief had been only tentatively approached. Great Britain had experimented after 1920 with an effort to include all the unemployed within the pattern of social insurance, and in 1934 acknowledged its failure by separating insurance, by reserving to insurance the contractual benefits for the unemployed entitled to them, and by placing on relief all workers, willing but unable to secure work, who were not eligible for insurance or had exhausted its benefits. The United States in 1935 had passed the Social Security act affording a limited protection for the unemployed by social insurance, but made cautious by Britain's experience of stretching the coverage of insurance too thin, made no provision for the rest of those involuntarily out of work. No other English speaking nation had made any effort by the end of 1936 to grapple with the problem of unemployment through social insurance.

Relief to the unemployed had little precedent in English speaking countries. The idea of the able bodied receiving assistance without work sounded, in the thrifty thinking of the Anglo-Saxon, too much like putting a premium on idleness. It was, in addition, a very expensive way to handle the support of the unemployed, in view of their number and the indefinite continuance of their worklessness. Again, Anglo-Saxon tradition placed the relief of its poor upon the locality in which they lived. This tradition had persisted for at least three centuries and was firmly embedded in law and judicial decision. But unemployment was not a local phenomenon; nothing done by a locality or its people caused it or could cure it. Its national nature seemed to indicate a national approach to its treatment. These considerations led all the countries during the decade 1937-46 to modify or discard the tradition of local responsibility for local need, either by the state assuming the entire responsibility for the relief of the unemployed, as Great Britain did, or by the state offering "grants-in-aid" to local governments for that purpose, as did Canada, Australia and New Zealand. In the United States, where the

conservative forces were strong enough to block any permanent and comprehensive plan for the care of the unemployed, the federal government undertook to care for certain of the unemployed at national expense. However, eligibility was measured by the means test.

There was a wide disparity of opinion as to the way the unemployed should be helped. Under the vigorous and all but universal tradition that the able bodied should work for their living, all countries except Great Britain provided artificially created work for them. (This method of "made work" was also employed by the western European powers in the same period.) In Great Britain it was claimed that "made work" was artificial and likely to turn out to be useless, after completion. It therefore, under the Unemployment Assistance board, treated the whole problem as one of relief on a national scale and with a national administration. Avoiding the acceptance of the unemployed as a uniform problem, the board studied the personnel of those under its responsibility, the length of time they were dependent, where they lived, their age, their working experience, if any. It attempted to break the mass into separate classes, each calling for different treatment.

The more promising and younger were given six months vocational training at public expense and thereafter had little difficulty in finding employment. The more ambitious were removed from the "derelict districts" from which industry had disappeared and placed in more favourable industrial localities where jobs could be had. The government subsidized self-activity projects started by the Society of Friends and taken up in several towns and parishes, whereby the unemployed undertook local improvements such as making parks and play spaces out of waste land or supplying services for local purposes, such as guides to the blind, readers to shut-ins. This movement, which added no income to the unemployed but restored their esteem in the eyes of their fellow townsmen, spread all over Great Britain, except the metropolitan centres, in the short time between its inauguration about 1935 and the end of unemployment in 1939. The board determined by research that although the total number of the unemployed rose at times (such as 1935) to more than 2,000,000, three quarters of the total were only temporarily without work; about 500,000 constituted the "hard core" of the unemployed, many of whom had not worked at all. Predictions, however, on their uselessness were proved false, for the war absorbed all of them in the military services or in industry. The same dire predictions were made at least in Canada and in the United States and were also demonstrated as fallacious.

In the countries which adopted "work relief" as a means of aiding the unemployed, the questions of choice of work presented some difficulties which proved insoluble, especially if it were assumed that such projects must not compete with private industry. The first project—raking leaves, selling a surplus of apples on the street corners—brought the whole plan into disrepute, and finally the state undertook such public improvements as were needed but could not be financed locally, irrespective of the possibility of doing them under contract with private contractors. In the United States, also, there was a wide diversification of projects, such as research, creative and historical writing, dramatics and general recreational projects. In spite of the obvious advantage of using the unemployed in a way best fitted to conserve their skill and to serve their localities, these skilled and unusual methods of spending public

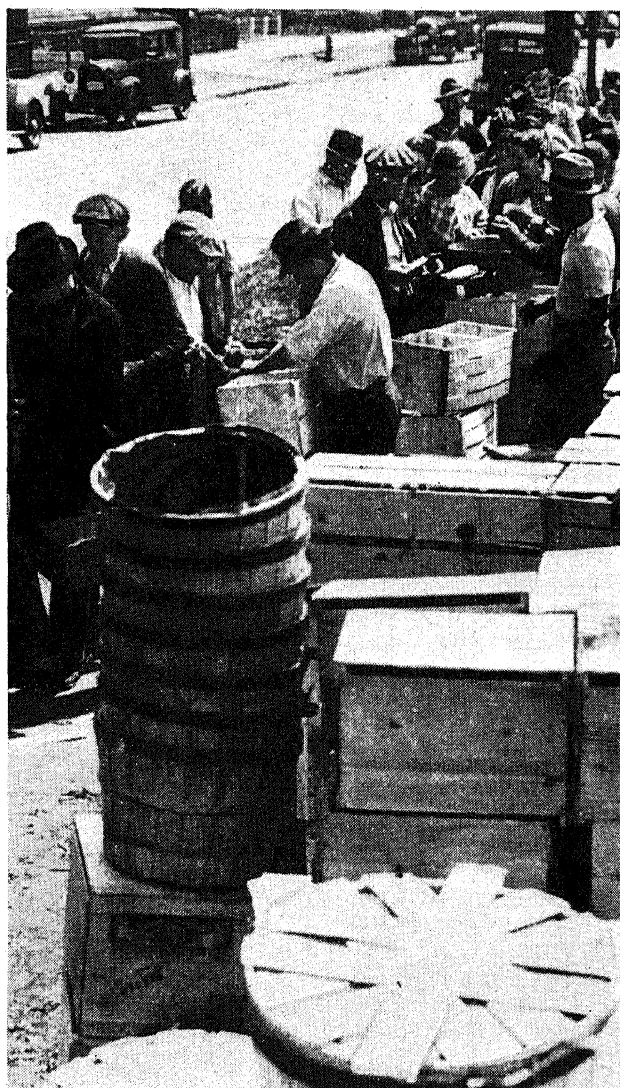
money on the unemployed provoked a good deal of opposition which compelled abandonment of many of them.

Another question which had been a nightmare to local relief administration was care of the transient. In periods of unemployment this had become a critical issue, for casual labour drifted to urban centres when out of work. The central government of Canada and the United States met this difficulty by financing entirely their care during the depression; but the problem still remained unsolved.

In the United States, the Federal Works Progress administration assumed entire responsibility for the treatment of the unemployed in 1935. During its existence to 1940, it furnished employment to about 8,000,000 persons and paid them more than \$9,000,000,000. There was no such effort to break down the mass of the unemployed into understandable units as in England, and some resistance arose in public opinion to diversify the jobs, as stated above. The only action in this direction was a negative one: congress, quick to sense articulate public criticism, passed a bill in 1936 removing from the rolls all who had been on them for 18 months or more, and made them ineligible for re-employment for 6 months.

Social Insurance.—During the decade, Canada and the United States were freed from constitutional restraint on federal action in the field of social welfare. The privy

Householders receiving relief rations of oranges, apples and rice in Cleveland, Ohio, where thousands applied for food during the "recession" of 1938



council in London, acting as supreme court, had ruled that the articles of confederation of Canada did not enable its federal government to enact a social insurance law for the entire dominion, but this disability was avoided by the device of grants-in-aid to the provinces. In the United States, it was tacitly understood that although it was specifically stated in the constitution that the purpose in establishing the government was (among other objectives) to promote the general welfare, "general welfare" did not authorize the federal government to enter the field of social welfare, traditionally a local function, but only to promote the welfare of the states in their relation to each other. Pres. Pierce in 1854 expressed that opinion in vetoing a bill to authorize the federal government to grant aid to the state in the task of caring for the insane. However, the supreme court, in a seven to two decision, given by Judge Benjamin Cardozo, upheld the old-age insurance provision of the Social Security act in May 1937, stating that "the problem is plainly national in area and dimension" and the act was "conducive to the general welfare."

During the first years of the decade 1937-46, other phases of relief were left by the several countries to a non-integrated series of provisions, adopted at different times and under varying influences. Provisions for old age were most prominent, with powerful political backing. Two sections of the Social Security act of the United States, one for social insurance, amended to include survivors in 1939, and one for assistance, grew to be the most important peacetime function of the U.S. government in point of volume. New Zealand, whose original provision for old age was made in 1898, and Australia, whose action dated back to 1908, continued to liberalize their laws. Great Britain authorized the Unemployment Assistance board (with name changed to Assistance board) to grant supplementary allowances to recipients of old-age benefits when it could be shown that the benefit was inadequate to maintain the beneficiary. This had previously been granted by the local poor boards.

Assistance to families with children whose breadwinner was dead, sick or otherwise unable to provide for them had been in effect after early in the century in all English-speaking countries except South Africa, and during the decade under review had been liberalized by increased allowances and broader scope, generally by the federal authority contributing a larger portion of the grant.

For the chronically and acutely sick, the story in the different countries varied widely. In the United States, there was no provision for either except for the blind, outside of poor relief, financed under the utterly unpredictable policy of local authorities. The very strong opposition to the federal government's entering this field blocked all efforts to enact a health insurance law or to provide for general health services. In all other countries, sickness and permanent invalidity were financed by the social insurances, generally recognized to be the most satisfactory and economical of all the forms of social insurance.

In 1938, New Zealand, by the passage of its Social Security act, broke entirely new ground by creating an all-inclusive pattern for its social services, including both social insurance and public assistance. Sir William Beveridge proposed an all-inclusive plan for Great Britain in 1942, but it was implemented only piecemeal and not as an integrated entity. Social insurance was still separated from public assistance, although the general trend was toward centralizing the administration of public assistance in the Assistance board and removing it from local poor law officials. The proponents of the Social Security act in the United States had hoped to secure an integrated, if

not a unified, program for the social services; but the final result was nine separate and wholly unrelated acts, some in public assistance, some in general welfare, some in social insurance, and leaving wide areas of need untouched.

New Zealand discarded the distinction of social insurance by making eligibility for any of its benefits independent of specific payments into the fund. Every wage earner paid 5% of his wages (plus a small registration fee semi-annually into the fund). Any deficit was made up by appropriations from the general revenue, which amounted to about one half its total expenditure. For this payment, a citizen of New Zealand was entitled to receive the following benefits without reference to any other source of income: the survivors of a wage earner could receive support during their minority and the widow until remarriage, the unemployed were entitled to specific allowances; the totally incapacitated were cared for during invalidity; the sick received medicine, medical and nursing services and hospital care; maternity benefits were made available, including two weeks of nursing service, hospital and medicinal care; old-age benefits beginning at 60 years of age; and if the commission found need not defined under the above descriptions, it was authorized to afford such assistance as necessary. In reality this was a co-operative venture on the part of the state and its citizens, whereby the state agreed to protect the citizen from economic need in return for a flat contribution geared to his ability to pay and to his need. This act was passed by the Labour party when it took over in 1938, and while it was in substance merely the continuance and liberalization of separate provisions previously adopted, its integration into a single system and its extension to cover all citizens without the means test was largely new. Observers said that it was considered an economically dangerous project by the more conservative citizens in New Zealand, and that it had become the subject of political conflict between the party in power and the older conservative group.

A new development in the field of social welfare was the so-called family allowance provision. Some economists had long urged that in a wage system such as conducted by modern industry, some provision should be made whereby marriage and children might not be economic handicaps. Four countries passed acts granting bonuses to families on the birth of children: Great Britain in 1945, Canada in 1944, Australia in 1941 and New Zealand in 1938. The amount given per child varied between countries; some did not grant an allowance for the first child; some graduated the amount per child, inversely to the number of children; but all granted them without reference to other income in the family.

Aid for Soldiers.—In the change effected in the economy of each belligerent, the entire pattern of welfare was altered by World War II. A few nations such as Australia strengthened regular assistance, including invalidity, old-age and maternity benefits, as war measures, but emphasis generally shifted from unemployment and other peacetime problems to measures to make good to families of servicemen (and servicewomen) the loss of income caused by enlistment of the breadwinner. The pattern for such provisions was pretty well laid during World War I and was followed without much change. In general, the allowances were increased in amounts, but the conditions under which they were given remained identical with those laid down in the Soldiers' and Sailors' Insurance and Allowance act drawn up for the United States by Judge Julian W. Mack in 1917, based on the experiences of the bel-

ligerent countries from 1914 to 1917. For wife and children, the enlisted man had to make an allotment from his pay, to be sent to his family. The government then added an amount graduated to the number of children if married and a flat amount, if a wife alone. It was not necessary in any of the countries under review for the man to have had a history of supporting wife and children, or that they have no other income. In some countries, illegitimate children were included in the provision for the benefits. It was clearly the intent of all Anglo-Saxon countries to provide some allowance for all who normally had a claim by marriage or birth upon the enlisted man's support, but not to inquire too vigorously into his previous habits in that regard.

With respect to others accustomed to look to the enlisted man for partial or entire support, the plan was somewhat different. As in the case of a wife, the enlisted man made an allotment from his pay; if already sending an allotment to a wife, the secondary allotment would be smaller in amount; in this case it was also necessary to show that he had contributed to the support of such relatives before enlistment, and the amount granted by the government was usually less per person than to a wife, and a total maximum was set, in most countries, to the government allowance. Beneficiaries were limited to parents (no country apparently made provisions for grandparents), brothers and sisters and grandchildren. The United States also offered enlisted men term insurance on their lives up to \$10,000 by assuming the cost of the extra occupational risk.

Generous provisions were made by all countries for the demobilized service men, including medical and hospital care, vocational training and fitting for vocational usefulness; most countries also granted disability pensions graduated according to severity of the handicap.

For the soldier on separation from the army, extensive provisions were made to compensate so far as possible for his loss of opportunity to earn during his years in service. Several countries granted a separation allowance (the United States of America); or transportation to their homes (Australia, New Zealand); most of them guaranteed that the discharged man could have his old job back and on the same conditions as if he had never left it (Canada, New Zealand, the United States); two (Australia and the United States) granted him support for a specified time depending on length of service; other countries (Canada, Great Britain and New Zealand) accepted his term of service as the equivalent of contributions to the unemployment insurance of from six months to a year. In addition to providing free medical and hospital service to the injured serviceman, at least Canada and the United States were making extensive provisions to furnish free hospital service to any discharged soldier whether or not the illness could be traced to his service. All countries under review made some provisions for loans to former servicemen. That of the United States was the least generous, offering merely to guarantee half of a loan secured from a finance company up to \$4,000, another evidence of the reluctance of that government to enter into competition with private business. Some countries loaned various sums for different purposes: New Zealand would loan up to £50 without interest and as much as £3,500 at low interest to enable the former soldier to purchase a farm.

It was in the field of education, however, that the most generous provisions were made. The United States led in this respect, offering as much as four years of grants for education, covering tuition and a maintenance allowance.

Canada offered less specific benefits, but on account of the ease of communication between the two countries it was likely that its provisions ultimately would not differ materially from those of the United States. (See also CHILD WELFARE; COMMUNITY CHEST; MUNICIPAL GOVERNMENT; PENSIONS, WAR [BRITISH AND EUROPEAN]; SOCIAL SECURITY; VETERANS' ADMINISTRATION; WAR RELIEF, U.S.)

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Relief, War

See WAR RELIEF, U.S.

Relief and Rehabilitation Administration, United Nations

See UNITED NATIONS RELIEF AND REHABILITATION ADMINISTRATION.

Religion

Exceptional and continuous stress throughout the decade 1937-46 was put upon evangelism, which was distinguished from its earlier forms by stressing the relevance of religion for the times and the need of corporate repentance and Christian conduct. Extensive interdenominational preaching missions were conducted each year, in addition to the separate efforts of denominations and single parishes. Experts in economic and social relationships were included in the evangelistic teams. Parallel efforts were specifically directed to particular groups, such as university faculties and students, teachers, ministers and the armed services. Series of "religion and life" weeks in Great Britain were similar to the evangelistic campaigns in the United States. Much of the evangelistic preaching of the decade, particularly during the war period, took place outside of churches, both to the armed services and to civilians attached to temporary industrial communities. Temporarily, at least, the methods of the church were greatly unstiffened. The most spectacular of mass evangelism efforts were those of the Roman Catholic Church in its great outdoor Eucharistic celebrations and the "Youth for Christ" campaign supported in many cities by the more fundamentalistic types of churches.

In 1945-46, the largest Protestant body, the Methodist Church, climaxed its postwar effort by a universal campaign of evangelism culminating in a permanent "New Life Movement."

The Church in Civilization's Crisis.—The sense of the church's responsibility for the moral guidance of civilization was expressed during the decade in the notable papal pronouncements and, particularly for Protestant and Eastern Orthodox bodies, in the Oxford World conference in 1937 on the church, community and state. The reality of the church as a universal society above the separate national communities was most concretely expressed in the organization of the World Council of Churches, in the maintenance of connection between churches of belligerent countries throughout the war, and in the partially effective effort to consolidate world-wide Christian attitudes with respect to the conditions of a durable peace as well as by vast provision of material aid in the period of

postwar rehabilitation. Even with the handicap of the imperfection of its own life and membership, the church increasingly expected to influence the course of society. Types of religion which previously had held aloof from political and social action as foreign to religion concurred in this "activist" attitude.

Missions.—The Madras, India, conference held early in the decade and attended by equal numbers of oriental and western delegates, was the most significant world-wide missionary gathering of modern times. Its distinctive ideas were (1) that the thought forms and the external practices of the Christianity of each people should reflect and express that people's distinctive culture; (2) that the mission-founded ("younger") churches were to be less dependent on foreign leadership and support and (3) that they must be freed from the necessity of continuing alien sectarian differences imposed upon them by their western teachers of religion. This situation, particularly in the orient, had not sufficiently cleared by the end of the decade to permit full appraisal of the results of World War II upon the church. The Christian institutions of eastern China escaped by migration for thousands of miles into the unconquered territory of the west. In occupied zones local churches generally continued, though in forced conformity to totalitarian controls. Meanwhile, however, the "orphaned" missions, both of the belligerent, the conquered and the otherwise isolated nations, cut off from their ordinary sources of support by the war, were continuously maintained through the co-operation of international Christian agencies. Between 1939 and 1945 nearly \$5,000,000 was raised for this purpose.

Religious Education.—Reflecting in part the reduced child population of the nation, the decade registered a very general and alarming decline in Sunday school enrolment, partially balanced by the development of supplementary methods of religious education, such as daily vacation schools, carried on by the majority of churches in many towns and cities, and by extensive though unevenly distributed processes of week-day religious education most generally upon released public school time. Los Angeles, for example, enrolled approximately 150,000 Protestant children and youth in such courses. Adult forums for the discussion of Christian faith and principles in their bearings upon social and national problems had increasing vogue, and the study interests of women's groups became broader in scope. Dissatisfaction with the results of previous methods led to radical experiments at popularization of religious materials. Thus a cartoon series on the Bible, patterned after the popular newspaper "funnies," was developed.

Pastoral Ministries.—Important developments provided the churches with greater skills in the exercise of the pastoral office and increasing technical expertness in personal counselling.

A substantial and scientifically recognized literature was created on religion as intimately related to health and the integration of personality. Considerable numbers of the clergy—including chaplains in the armed forces and in institutions—became increasingly competent in diagnosis of personality problems.

The Bible.—The Bible continued to be the world's best seller. For the first time in history its production was rationed, on account of the paper shortage during World War II. The wartime destruction of printed matter caused an enormous postwar demand for Bibles as an aid to the cultural rehabilitation of the world. In 1938 a Roman Catholic revision of the Douai New Testament was published, and in 1946 the Protestant revision by a distin-

guished group of scholars of the American Standard New Testament appeared. Both sought to assimilate the new Testament to contemporary speech. The Protestant revision attempted at the same time to retain the older literary qualities of the King James version as one of the main fountainheads of the English tongue.

Personal Religion.—The decade saw a vast production and consumption of literature dealing with the cultivation of the inner life. The Methodist devotional quarterly, *The Upper Room*, for example reached an annual circulation of more than 8,000,000. A steady stream of books, such as Dr. George Buttrick's *Prayer* (1942), enjoyed wide popular use, along with republications of some of the mystical classics and interpretations of the lives of the saints. "Retreats" for the intensive cultivation of the devotional life became customary among the clergy, women's groups, and Christian youth, and in the "Ashrams" imported by Dr. E. Stanley Jones and others from India.

Public Worship.—The worship of the churches became more liturgical, as shown in the publication by numerous denominations of new service books, such as the new Methodist Book of Worship (1945). Wider use was made of the seasons of the Christian year, particularly Lent and Holy Week. More sources of liturgical material were drawn upon by Protestants. Church architecture became more dignified and more carefully designed as a setting for worship. Gowns in the pulpit and choir loft were much more frequent than formerly.

Theology.—In the Protestant religious world, theology unquestionably was taken more seriously in the decade 1937-46 than for many years. Promising groups of young theologians produced creative work in the educational centres of the east, in Chicago and on the Pacific coast. A great shift of thinking on the part of influential U.S. leaders was evidenced by a series of articles in the *Christian Century* (1946) on "How My Mind Has Changed in This Decade." There was a revolt from the previously dominant liberalism, largely through continental influences, notably the writings of Karl Barth and Emil Brunner. In contrast with trust in human reason, theology of this type called for a "God-centred" faith, stressing the sovereignty of God, His strange and inexplicable ways, and the complete dependence of man on His grace and self-revelation. The disorders of the contemporary world were widely understood as divine judgments upon the sinfulness and stupidity of man. The most extreme views went on to see in the disasters of the war period and the threatened atomic wholesale destruction of humanity portents of the literal end of human history. A "newer liberalism," on the other hand, though inclined to accept correction by profounder and more tragic insights into the reality of evil, declined to deny all capacity or dignity to human reason. The Roman Catholic theological line continued to be essentially rationalistic, and many theologians, both Catholic and Protestant, sought to reinstate the idea of a universally valid natural law, harmonious with revelation, as a ground for adjustments between competing classes and nations and an authoritative basis for a world morality. Controversies between these diverse theologies were sharp but in general did not cause any further basic divisions of the churches.

Social Tensions.—During the decade 1937-46, religion increasingly concerned itself with problems of the social and economic order. In repeated declarations beginning with the Oxford World conference of 1937, it was insisted that a righteous social order should recognize "the native

worth and dignity of man," that human labour should not be treated as a mere commodity, and that over-emphasis on the profit motive was wrong. The course of human history in the decade vividly high-lighted the issues at stake; the totalitarian powers, the challenge of the U.S.S.R., labour government in England and planned economy in the United States, heightened attention to the role of religion as an interpreter of these "secular" fields. The Roman Catholic position was elaborated in clearcut and highly important papal encyclicals which gave the Catholic Church a distinct moral advantage, while the actual absence from the white Protestant churches of the U.S. of the organized labour element, was a matter of active self-criticism and reproach. The increased number of Negro industrial workers went far towards evening the balance between the faiths at this point. Throughout the period authoritative Protestant pronouncements on social and economic matters inclined to be "leftish." Thus, the important Malvern conference in England, sponsored by Dr. William Temple, later archbishop of Canterbury, while defending private property, proposed its extensive limitation on moral grounds. In all this period it was hard to find an unconditional defense of the existing economic order by an influential Protestant church body. The churches were subject to increasingly aggressive cultivation both by the C.I.O., whose able representatives attended most important church conferences, and by the National Association of Manufacturers, which after 1940 maintained a committee for "conference with the churches."

Other Ethical Issues.—Two other major ethical issues were (1) imperialism as instanced in India, China and the colonial system in general, also in indirect controls by the United States in Central and South America; (2) racial injustice, primarily in Negro-white relations, including frequent segregation in the church itself, and especially when coupled with cultural and religious antagonisms as in the case of anti-Semitism. In deliberate contrast with ameliorative philanthropy and mere theological teaching in the pulpits and schools, "social action" departments were set up by numerous denominations, which directly participated in industrial controversies, and set up radical experiments in human relationships.

Church and State.—The totalitarian regimes uniformly undertook direct control of the churches within their territories and limited freedom of worship. The claims of the state to be supreme were interpreted by the churches as virtually the setting up of rival gods. State authoritarianism was stoutly resisted by elements of the German church, both Protestant and Catholic. The churches in the several occupied countries, notably Norway and Holland, became centres of stubborn resistance throughout the war. In Japan, the totalitarian government forced upon the relatively feeble church forms of emperor worship and complete state control. In the soviet union, the government first oppressed the church in behalf of official godlessness, but at the end of the decade was showing an inclination to use the church as a political pawn in the traditional Byzantine fashion. In the soviet sphere of influence there was a mass transfer of Uniate Catholics in Galicia to an Eastern Orthodox jurisdiction. The rising consciousness and more independent course of the Arab peoples in the near east intensified problems between Christianity and Mohammedanism. All nations coming to independence were naturally inclined to raise issues of nationalism versus foreign influences in the field of religion. Pandit Jawaharlal Nehru, however, reassured the Christian world with

respect to missions in India. The western churches exerted successful pressure toward bringing a declaration of personal freedom, including freedom of religion, into the charter of the United Nations, and pressure continued to get it implemented by specific requirements in the peace treaties.

The War Ordeal and Postwar Developments.—Representatives of the World Council of Churches, then in process of formation, were dispersed by the beginning of hostilities. Churches in nations which became immediately belligerent were compelled to make early choices between active participation in the war or obstruction of the war effort. Almost uniformly confessing wrong on both sides and minimizing hatred throughout the conflict, they invariably went along with their respective nations. Active criticism of war measures was, however, kept alive in all the democratic countries. The Methodist General conference in 1939 resolved that it could not support or participate in war; in 1941, the general assembly of the Presbyterian Church, U.S.A., barely defeated a proposal to repeal the historic doctrine of that church that a "just war" might be supported. As the war progressed, however, the churches reached the practically unanimous conclusion that it was their duty to support the nation in this crisis. From 1941 the pacifists ceased active opposition. Most of the drafted members of the historic peace churches declined to claim exemption as conscientious objectors. Justification for support of the war was found in such arguments as that relied upon by the *Christian Century*: that Christian conduct must be relative to time and place and that no absolutely good or bad alternatives are open in a war period. Besides the recruiting of the chaplaincy, extensive war services sprang up in all the churches and resulted in far-flung co-operative measures. Thus, the war emergency activities of the Federal Council of Churches doubled its normal expenditure.

Many churchmen, however, remained perplexed over the churches' seeming inconsistency both of thought and conduct.

The churches' postwar attitudes were expressed, on the one hand, in vast measures of relief and rehabilitation extending both to the oppressed peoples and almost immediately to the defeated belligerents; and on the other hand in concern for creating conditions for a just and durable peace. A series of representative U.S. study conferences authorized by the Federal Council of Churches made important contributions at this point, such as the modification of the Dumbarton Oaks proposals in a more definitely Christian direction and the support of the United Nations. No solid agreement, however, was reached as to immediate U.S. postwar policy.

In 1946 most of the church gatherings, both denominational and interchurch, were opposing peacetime conscription.

Interfaith Co-operation and Conflict.—Oppression at the hands of the totalitarian regimes tended to unite the separated Christian churches in sympathy and common resistance. Protestant and Catholic fronts in Germany reinforced one another. In 1941, Roman Catholic, Church of England and Free Church leaders of Great Britain joined in a significant wartime declaration, directly supplementing a Papal utterance, and parallel action by the united Protestant bodies and the Catholic Sword of the Spirit movement went forward along important lines. Practical

Westminster cathedral, London, on the fourth British national day of prayer, March 23, 1941. A wounded veteran of the R.A.F. is shown at prayer





sympathy and some measure of protection were extended European Jews as among the chief victims of persecution, and the organization and utterances of interfaith movements in the U.S. sought to check anti-Semitism. Serious tensions, nevertheless, arose and were even accentuated in the postwar period.

(See, however, **CHRISTIAN UNITY**.)

No attempt could be ventured on the basis of this brief review to draw up a balance sheet for religion. The factors canvassed were of very unequal weight. On any mere listing, gains appeared much to exceed losses, and might ultimately prove to outweigh them in the scales of history as well as possibly in the judgments of eternity. (See also **CHURCH MEMBERSHIP**; **LIBERALISM**; **MISSIONS, FOREIGN**; **SUNDAY SCHOOLS**; also under separate denominations.)

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World Religions			
Religion	Area of Dominance	Estimated Number of Adherents	Percentage of World Population
Roman Catholic . . .	Italy, France, United States	315,000,000	15.
Orthodox Eastern (including Greek and Russian Orthodox) . .	U.S.S.R. and eastern Mediterranean	117,700,000	5.
Protestant	United States, Great Britain, Germany	235,000,000	11.
Hebrew	Europe	15,800,000	1.
Moslem	India, Netherlands Indies, northern Africa	285,000,000	13.
Shinto	Japan	16,000,000	1.
Hindu	India	239,000,000	11.
Sikh	India	4,000,000	.2
Jain	India	1,000,000	.05
Buddhist and Lamaist . .	China, Japan, Tibet . .	165,000,000	8.
Confucianist and Taoist .	China	285,000,000	13.
Primitive, Animist, Fetish and Magic	Nigeria, India and Netherlands Indies	210,000,000	9.
All others, including state religions		275,500,000	12.75
		2,164,000,000	100.00

Religious Denominations

See **CHURCH MEMBERSHIP**.

Jewish holy day services in 1945 were the first in the decade 1937-46 to find world Jewry free of the most violent threat to its existence in modern history

Relocation, Japanese

See **ALIENS**; **WAR AND DEFENSE AGENCIES**.

Renner, Karl

Renner (1870-), Austrian statesman, was born Dec. 14, 1870, the son of a peasant, at Dolní-Dunajovice in Moravia (then part of Austria-Hungary). He joined the Social Democratic party in his youth and was elected to the Austrian parliament in 1907. A powerful influence among the Social Democrats, he became leader of that party and repeatedly attacked the government.

After the fall of the monarchy Renner became the first chancellor of the new Austrian republic. During the chaotic era that followed conclusion of World War I, Renner successfully steered the republic through political attacks from both right and left. He headed the Austrian peace delegation that signed the treaty of St. Germain-en-Laye on Sept. 10, 1919.

After a conflict with the Christian Socialists in his cabinet Renner lost the chancellorship in June 1920. He stayed in the cabinet as foreign minister for four months, resigning in October. Thereafter, his influence rapidly declined.

Toward the close of World War II it was announced in Moscow (April 29, 1945) that Renner had been named chancellor of an interim Austrian regime. His cabinet was made up of a coalition of Social Democrats, Christian Socialists and Communists. Renner proclaimed Austria's independence on May 14, 1945, abolishing all nazi laws and restoring the laws of the former republic; his government was recognized by the Allied Control Council for Austria on Oct. 20, 1945.

After the victory of the Catholic People's party at the polls, Nov. 26, 1945, Renner resigned as chancellor, but the following month (Dec. 20), he was elected president of

the second Austrian republic by unanimous vote of parliament.

Reparations (World War II)

While Allied guns were still shelling Cologne and the Rhine remained a barrier to penetration of Hitler's reich, the U.S.S.R. brought up the question of World War II reparations at the three-power conference held at Yalta, Feb. 4-11, 1945. Among other things, the U.S.S.R. proposed that German reparations be set at approximately \$20,000,000,000, of which it would get half. Although the United States agreed to consider this proposal as a basis for discussion, it made no commitment on the soviet proposals; neither did Great Britain.

The Yalta conferees agreed that Germany, after its defeat, should be made to compensate the Allies for damages sustained as a result of the German aggression, such compensations to be made "in kind" to the greatest extent possible, including use of German labour. They also agreed to establish a reparations commission at Moscow.

The Allied Commission on Réparations met at Moscow, June 11-July 14, 1945. It comprised: for the United States, Edwin W. Pauley, personal representative of the president; for the United Kingdom, Sir Walter Monckton; for the soviet union, Ivan M. Maisky, Deputy Commissar for Foreign Affairs.

The commission reached general agreement on a plan providing for (1) maximum possible compensation "in kind"—in goods as opposed to money—to the Allied nations on the basis of their contributions and losses in bringing about the defeat of Germany; (2) elimination of Germany's war-making power through removal of machinery and equipment not essential to a minimum German civilian economy; and (3) maintenance of sufficient German means of livelihood to obviate the necessity of Allied support of the German people.

The commission's plan was approved by the Big Three conference at Potsdam, July 17-Aug. 2, attended by the heads of the United States, the United Kingdom and the U.S.S.R. and their foreign secretaries. The conference, however, placed reparations on a zonal basis, under which the U.S.S.R. would obtain its reparations from the soviet zone of occupation, plus certain German external assets. In addition the soviets would receive outright 10% of the industrial equipment removed from the western zones, plus an additional 15% from the western zones for which they would pay in an equivalent value of food, coal and other products. It was provided that Poland's claims for reparations would be met from the soviet union's share.

The claims of all other countries would be met, under the Potsdam agreement, from the zones occupied by the United States, the United Kingdom and France, plus certain German external assets.

Power of decision on removals from Germany was vested in an Allied Control council (*q.v.*), composed of the heads of the military governments of the four zones. Under the Potsdam protocol, reparations removals were to be completed two years after the amount and character of German industrial equipment unnecessary for the German economy had been determined by the council.

From Nov. 9 to Dec. 21, 1945, representatives of 18 nations held the Paris Conference on Reparations. The conference agreed on the percentage share each nation was entitled to claim of total reparations from the western zones of occupied Germany. The conference established the Inter-Allied Reparations agency, composed of a representative of each nation, to allocate German reparations among the signatory nations.

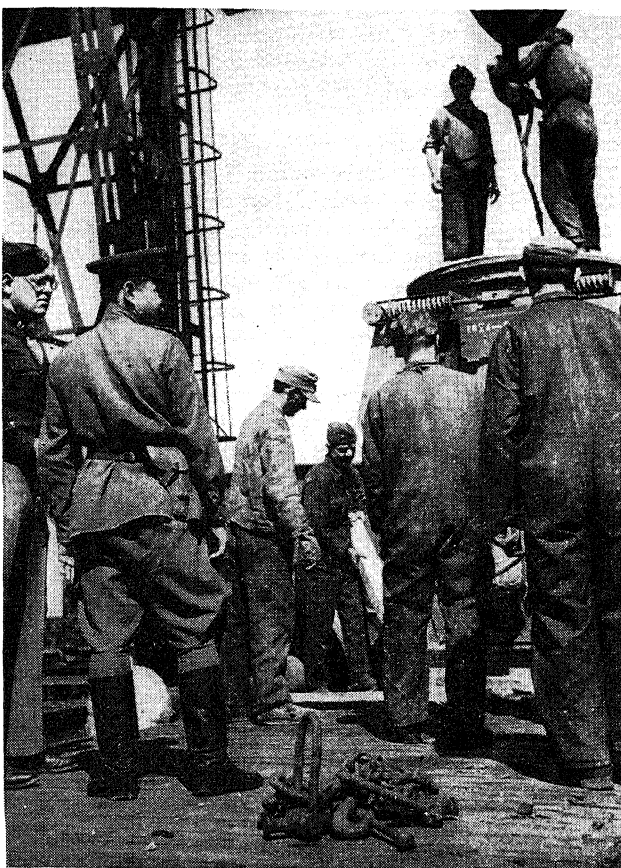
Meanwhile, during the Potsdam conference, the heads of the governments of the United States, the United Kingdom and China had issued a proclamation offering terms of surrender to Japan, which included a provision that Japan would be allowed to maintain such industries as might sustain its economy and pay reparations, but not re-arm for war.

Three months after V-J day a U.S. reparations mission headed by Ambassador Pauley arrived in Tokyo to determine how much of Japan's industrial plants and industrial equipment should be removed as reparations. A report of this study together with recommendations for immediate removals of certain Japanese industrial equipment was submitted to the President Dec. 18, 1945.

Within six months the Far Eastern commission, comprising representatives of 11 nations which had warred against Japan, adopted policies defining interim removals of Japanese industrial installations, largely based on the Pauley report.

In May 1946, Ambassador Pauley, at the request of the president and secretary of state, returned to the far east with a mission of experts to study industrial installations of Korea and Manchuria and the needs of those countries in relation to reparations removals from Japan. The principal purpose of the mission was to obtain information and make recommendations to assist the United States and its Allies in planning a program of economic rehabilitation for the far east designed to contribute to the peace and security of that area and of the world. Following the mission to the far east, Ambassador Pauley went to Europe

Work detail in a German power plant being dismantled for shipment to the U.S.S.R. as reparations. Supervising (left), were one U.S. and one Russian representative of the reparations section of the military government in Bavaria



772 where he attended the Paris conference in July and investigated the implementation of the Potsdam agreement on German reparations. (See also ALLIED MILITARY GOVERNMENT; PEACE NEGOTIATIONS, WORLD WAR II.) (E. W. PY.)

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Representation, U.S. Congressional

See CENSUS DATA, U.S.

Representatives, House of

See CONGRESS, UNITED STATES; ELECTIONS.

Republican Party

The Republican party made a slow, uphill climb through the decade 1937-46, and in the difficult ascent it found itself forced to discard its 1920-40 attitude on many major questions of domestic and foreign import. When the G.O.P. returned to power on Capitol hill in the congressional election of 1946 after the longest exile in its 90 years of existence, it had shifted from its earlier policy of nonintervention to one of limited co-operation in world affairs. It had also embraced many social and economic reforms which it had abhorred when they were first proposed by Franklin D. Roosevelt.

It still remained, however, the party of conservatism and of trust in the system of private enterprise. It made its concessions to new national and world demands slowly and cautiously in accord with its traditions.

The Republicans' disastrous defeat in 1936 was partially responsible for this metamorphosis. Alfred E. Landon carried only Maine and Vermont and the party suffered accordingly. It elected only 17 senators, 89 house members and 8 governors.

Through 1937 and 1938 the party remained in an apathetic state. John D. M. Hamilton, who had been named national chairman by Landon, had to devote most of his time to liquidating the heavy debt incurred in the 1936 struggle. The Republicans in congress were too few to function as a parliamentary opposition.

Downslide Arrested.—It was not until Nov. 8, 1938, that the Republicans reversed an eight-year downward trend. On that election day they elected 8 new senators, 81 additional members of the house and boosted their total of governors to 18. Although their principal victories were scored in the agricultural midwest, they made substantial gains in New England and the industrial east.

Two young but important figures made their bow on the Republican stage in the 1938 contest. Thomas E. Dewey, brilliant New York lawyer, lost the gubernatorial race to Herbert H. Lehman by a narrow margin. In Minnesota, 31-year-old Harold E. Stassen defeated Elmer A. Benson for the governorship, ending Farmer-Labor control. In Wisconsin, the La Follette machine was badly damaged when Philip La Follette was defeated for reelection as governor.

The party began to play a more active part in national affairs in 1939. Its increased membership in congress—23 senators and 169 house members—enabled it to provide real opposition, especially in alliance with rebellious, conservative Democrats.



Senator William E. Borah of Idaho, who led the nonintervention bloc within U.S. Republican party ranks in 1939 after the outbreak of war in Europe. Sen. Borah died in 1940 before the U.S. entry into World War II

Even before the outbreak of World War II, the G.O.P. took a strong stand against U.S. involvement in European power politics. Its chief spokesman on foreign matters, Sen. William E. Borah of Idaho, bluntly told Pres. Roosevelt at a White House conference: "My sources of information are as reliable as yours. There will be no war in Europe!" With a few exceptions, the minority opposed the administration's attempt to repeal the embargo on shipment of arms to belligerents, even after Adolf Hitler's attack on Poland.

The spectacular struggle for the presidential nomination in 1940 helped to bring the Republicans to life—and hope. They needed drama to arouse public interest and imagination, and they got it. Moreover, it appeared that they might have an outside chance to win, because it had become evident that Roosevelt meant to try to break the two-term tradition. Until he broke it twice, it was thought that the U.S. people might rebel against such a violation. Three men appeared to share the lead in early 1940. They were Dewey, Sen. Arthur H. Vandenberg of Michigan and Sen. Robert A. Taft of Ohio. When Dewey defeated Sen. Vandenberg in the Wisconsin and Nebraska primaries, the contest seemed to narrow down to the New Yorker and the son of the former president.

But when these two contenders deadlocked on the early ballots, the convention turned to Wendell L. Willkie, utility lawyer and magnate, on the sixth roll call. He had captured the public fancy by a whirlwind, last-minute campaign, although this was his first adventure in politics. Sen. Charles L. McNary of Oregon was named for the vice-presidency. Willkie selected Rep. Joseph W. Martin, Jr., of Massachusetts, house minority leader, as his national chairman.

Opposing participation in foreign wars, the platform urged a stronger national defense, demanded a cut in federal expenditures and denounced the grant of "excessive power" to the president by the Democratic congress. Willkie, however, endorsed many New Deal reforms and projects, merely maintaining that he could execute and manage them more efficiently and economically.

In the Nov. 5 elections, Willkie polled 22,304,755 votes against 27,243,466 for Roosevelt. It was the largest popular vote ever given to a Republican presidential nominee. The electoral tally was 449 to 82. Willkie carried ten states: Maine, Vermont, Michigan, Indiana, Kansas, Nebraska, Iowa, North Dakota, South Dakota and Colorado. The G.O.P. gained 5 senate places for a total of 28. It lost 7 in the house, reducing its membership to 162. It raised its gubernatorial quota from 18 to 20.

After his defeat, Willkie threw himself into the crusading

role that was to give him great influence in shaping Republican thought on the European conflict and world affairs. Returning from a trip to England, he urged all-out aid to Great Britain. He testified before congressional committees in favour of enactment of the pending lend-lease bill, boldly admitting that his earlier pledges to keep the U.S. out of war, if elected, had been only "campaign oratory."

For a while, however, G.O.P. sentiment on Capitol hill remained predominantly non-interventionist. A majority voted against the administration proposal to amend the Neutrality act to permit the arming of U.S. vessels. Only 23 house Republicans supported lend-lease. Only 7 senators and 21 in the house voted for extension of the draft act, which squeezed through the lower body by only one vote.

With the Japanese attack on Pearl Harbor on Dec. 7, 1941, the Republicans joined the Democrats in mobilizing the nation's resources for war against the axis. Only one member, Jeannette Rankin, Montana Republican, opposed the declaration of hostilities against Japan on Dec. 8. Both houses unanimously approved the war challenge to Germany and Italy on Dec. 11. On Dec. 10, in an exchange of letters, Rep. Martin and Edward F. Flynn, Democratic national chairman, agreed to abandon partisanship on all questions affecting prosecution of the struggle.

Toward Internationalism.—The G.O.P. moved nearer Willkie's international platform when the national committee met at Chicago in April 1942, to redefine its position on war issues. The 1940 standard-bearer urged a statement favouring U.S. co-operation in building a new world order. Senator Taft held that there should be no declaration on postwar policies until after the close of the conflict. The foreign policy resolution finally adopted said: "We realize that after this war the responsibility of the nation will not be circumscribed within the territorial limits of the United States, that our nation has an obligation to assist in the bringing about of understanding, comity and co-operation among the nations of the world in order that our own liberty may be preserved and that the blighting and destructive processes of war may not again be forced upon us and upon the free and peace-loving peoples of the earth."

In a "declaration of policy," house Republicans subsequently endorsed this acceptance of the fact that the U.S. should face and meet international responsibilities after the war.

The 1942 congressional contests restored the Republicans to the status of an effective opposition on Capitol hill. They gained 10 additional senate seats, giving them 38. In the house they increased their strength to 209, or 9 less than a nominal majority. They added 5 governorships to their list for a total of 23, including New York, California and Michigan.

Two of the more prominent figures who came to power at this time were Dewey, who was elected governor of New York, and Earl Warren, who was elected governor of California. John W. Bricker was re-elected governor of Ohio and Stassen won similar honours in Minnesota.

G.O.P. congressional gains in 1942 meant the death of New Deal domestic reforms. In alliance with about 60 southern Democrats in the house and 15 in the senate, the Republicans were usually able to defeat or sidetrack any measure they opposed.

Following the November election of 1942, Rep. Martin submitted his resignation as national chairman. He was succeeded by Harrison E. Spangler, Iowa lawyer,

farmer and business man, who gave full time to the post and set out to build up an organization from the grass roots.

Casting aside the last vestige of non-intervention, the G.O.P. in 1943 subscribed to a program of full United States association with other democracies and peace-loving nations in the postwar era. Meeting at Mackinac Island, Mich., on Sept. 7, 1943, in what amounted to an off-year convention, the Postwar Advisory council declared for "responsible participation by the United States in postwar co-operative organization among sovereign nations to prevent military aggression and to attain permanent peace with organized justice in a free world."

The G.O.P. formally underwrote this pledge when the minority representation in congress voted overwhelmingly for the Fulbright resolution in the house and the Connally resolution in the senate. These two proposals committed the U.S. to support of an international organization "with adequate power" to preserve world peace—a program that led to creation of the United Nations.

The Mackinac convention, however, condemned the administration's domestic policies. After advocating greater encouragement of "private enterprise" and postwar "termination of rationing, price-fixing and all other emergency powers," the council said:

"The present program of the New Deal Administration, with the enlargement thereof set forth in the reports of the National Resources Planning Board, would wreck the country because the only remedy it proposes is unlimited government spending of borrowed money. It would sacrifice business, agriculture and the professions. It would extend the power of government until ultimately no man or woman could act, write or speak without approval. It would substitute for American liberty the regimented existence of a subject people."

National Chairman Spangler reported that he had placed Washington headquarters on an all-year-round basis, with a staff of full-time publicists and researchers, whereas previously it had been dark and inactive save for a few weeks before each election. When Rep. J. William Ditter of Pennsylvania was killed in an aeroplane accident in late November of 1943, he was succeeded as chairman of the Republican congressional committee by Rep. Charles A. Halleck of Indiana.

The political wisdom of the foreign policy shift at the Mackinac Island meeting became evident from the results of early 1944 primaries. Such arch-opponents of intervention as Rep. Hamilton Fish of New York, Stephen A. Day, Illinois congressman-at-large, and Melvin J. Maas of Minnesota were retired by Republican constituents who had hitherto shown a prejudice against U.S. involvement in world affairs.

The Republican national convention took note of this changing sentiment when it assembled at Chicago in June. After a short session in which three governors were the principal contenders—Dewey of New York, Bricker of Ohio and Warren of California—the delegates nominated Dewey for president and Bricker for vice-president on a platform that incorporated the Mackinac statement and specifically pledged "collaboration" with the United Nations, which had already begun to assume shape at a meeting of world statesmen at Dumbarton Oaks, Washington, D.C. In fact, John Foster Dulles, Dewey's adviser on foreign affairs, acted as Sec. Cordell Hull's aide at these preliminary U.N. sessions.

The G.O.P. also made many concessions to New Deal

domestic reforms, as did Dewey in his campaign utterances. The platform "accepted the purpose" of the National Labor Relations act, the Wage-Hour act, the Social Security act and "all other statutes designed to promote and protect the welfare of the American workingmen and women." Indeed, it recommended extension of old-age and unemployment insurance to employees not already covered.

To the farmers, in language paralleling Democratic promises, the Republicans offered "an American market price . . . and the protection of such price by means of support prices, commodity loans or a combination thereof."

But the platform, and later Gov. Dewey, sharply condemned the Democratic administration of these reforms. The Republican candidate reiterated that the federal government was managed by "tired, quarrelsome old men" and insisted that "it is time for a change."

"Don't Change Horses."—Although Dewey's sharp and forceful campaigning forced Roosevelt to forego his original plan of not seeking votes "in the conventional sense," the New York executive led a hopeless cause. Voters hesitated to change a commander in chief in mid-conflict. U.S. troops under Dwight Eisenhower and Douglas MacArthur, respectively, had landed in Normandy and on the outer Philippine Islands. Organized labour, especially Sidney Hillman's C.I.O. Political Action committee, rang doorbells and registered Roosevelt voters in all the great industrial centres. In the last few weeks of the battle, Roosevelt delivered six of his most stirring appeals, winding up with the promise to provide 60,000,000 jobs in the postwar period.

The popular vote was 25,602,505 for Roosevelt and 22,006,278 for Dewey. The electoral count was 432 to 99. The Republican nominee carried 12 states: Maine, Vermont, Ohio, Wisconsin, Indiana, Kansas, Nebraska, Iowa, Colorado, North Dakota, South Dakota and Wyoming. The Republicans made a net gain of 1 senate seat for a total of 38, a figure soon to be increased to 39 through the death of Frank Maloney, Connecticut Democrat, and the appointment of Thomas C. Hart, Republican, to the vacancy.

The G.O.P., oddly enough, lost 19 house places, giving them 190 seats as against 243 for the Democrats. There was one representative of the American Labor party and one Farmer-Laborite.

The Republicans used the off-year of 1945 to strengthen their national organization and to formulate definite principles on which to try to regain control of congress in 1946 and of the White House in 1948. Meeting at Indianapolis on Jan. 22, 1945, the national committee approved National Chairman Herbert E. Brownell, Jr.'s program of headquarters' expansion. He immediately established new departments for handling problems involving radio, research, labour, veterans, women, young Republicans, finances and speakers. John A. Danaher, former senator from Connecticut, was named legal counsel and congressional liaison man. William C. Murphy, Jr., veteran Washington correspondent, was placed in charge of publicity. Hugh R. Wilson, former ambassador to Germany and assistant secretary of state, was selected as adviser on foreign affairs.

A congressional policy committee, headed by Sen. Taft of Ohio and Rep. Halleck of Indiana, framed a statement of aims and principles for party field workers and candidates. Although it received a mixed reception as "too vague" and "too conservative," it was endorsed by the

national committee at a Chicago meeting on Dec. 8, 1945.

"Today's major domestic issue," said the document in part, "is between radicalism, regimentation, all-powerful bureaucracy, class exploitation, deficit spending and machine politics, as against our belief in American freedom for the individual under just laws fairly administered for all, preservation of local home rule, efficiency and pay-as-you-go economy in government, and the protection of the American way of life against either fascist or communist trends. . . ."

"In foreign affairs we shall continue to strive to avoid partisanship. But we shall also seek to avoid secrecy, inefficiency and drift. . . . We consider that the maintenance of a strong, solvent and free America is the basis of our greatest contribution to world order."

Several key G.O.P.-ers translated into action the pledge to "avoid partisanship" in foreign affairs. By appointment of Pres. Roosevelt, Sen. Vandenberg and ex-Gov. Stassen were members of the U.S. delegation to the April 1945 San Francisco convention which chartered and organized the United Nations. Vandenberg subsequently served as adviser to Secy. James F. Byrnes at many U.N. conferences in the U.S. and in Europe. Ex-Sen. Warren R. Austin of Vermont was an important member of the U.S. delegation to the conference of Chapultepec, which framed plans for a Pan-American alliance. President Harry S. Truman later named him as the nation's representative to the U.N.

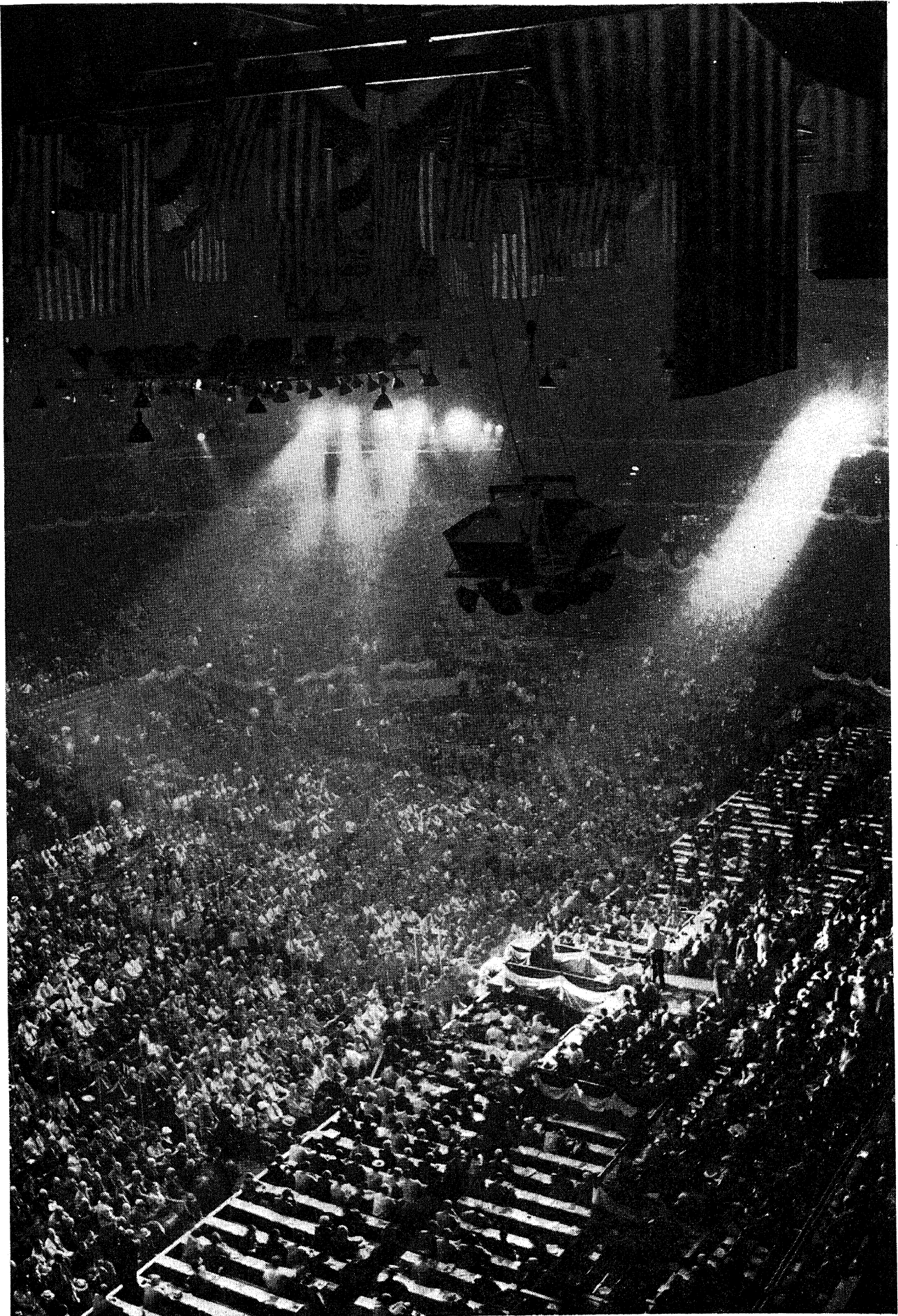
The Republicans in congress rallied behind Harry S. Truman when he entered the White House upon Roosevelt's death on April 12, 1945, but the nonpolitical honeymoon was short-lived. The end of the war against Japan on Aug. 14, 1945, stirred twinges of partisanship, but it was the new executive's legislative program, which he submitted to congress on Sept. 6, 1945, that terminated the Pennsylvania avenue alliance. G.O.P. leaders branded it as "ultra-New Dealish," whereas they had expected more moderate and temperate demands, and immediately joined with conservative Democrats to modify or defeat the presidential proposals.

Less than 50% of Truman's requests became law and many of those only in a drastically amended and diluted form. For example, his demand that congress establish economic machinery for providing "full employment" emerged from the legislative mill only as a pious and generalized admission that it would be beneficial to the individual and the country if every able-bodied man and woman could have a job.

Truman's legislative relationship with the second session of the 79th congress had a far-reaching political effect. His inability to obtain favourable action on labour, racial, social and economic measures from an overwhelmingly Democratic congress antagonized those elements which would have benefited from their passage—elements, too, which had always voted enthusiastically for Roosevelt. His helplessness in the face of a bipartisan coalition on Capitol hill aroused popular suspicion that he lacked force and decisiveness.

Momentum.—The 1945 elections were sporadic and confined to local battlefields. But they showed trends favourable to the G.O.P., based on the loss of so striking a leader as Roosevelt, a defection from the less magnetic Truman, a breakup of the heterogeneous Democratic (New Deal) organization and the first clash between a Democratic ad-

Floodlights playing down on more than one thousand delegates assembled at the Chicago stadium for the Republican national convention in 1944





Demonstration for Governor Thomas E. Dewey of New York at the Republican National convention in Chicago before he was nominated as the party's presidential candidate on June 28, 1944.

ministration and important groups of organized labour in 12 years.

The G.O.P. carried all three special elections held after Truman became president—in New Jersey, Illinois and Montana. National Chairman Brownell said he thought the results significant because the Democratic candidates in New Jersey and Montana had campaigned on a "Support Truman" platform.

The Republicans also scored important mayoralty victories in such industrial and democratic centres as Detroit, Buffalo, N.Y. and Hartford and New Haven, Conn. In the automobile capital, Mayor Edward J. Jeffries was re-elected over Richard T. Frankensteen, vice-president of the United Automobile Workers of America, a C.I.O. union. Although Detroit had a nonpartisan election system, Democratic National Chairman Robert Hannegan backed Frankensteen. Labour disturbances in the area were held partially responsible for the defeat of the C.I.O. entry.

William F. O'Dwyer, the Democratic nominee, won the New York city mayoralty contest after 12 years of Tammany exile under F. H. La Guardia, who did not seek re-election. However, of 2,000,000 votes cast, O'Dwyer got merely 840,000 under the party emblem or only a few thousand more than the combined total polled by his opponents. He owed his great lead to the support of the American Labor party and liberal ballots. Newbold Morris, whom Mayor La Guardia backed in protest against both the Democratic and Republican nominees, rolled up the surprising total of 399,437 votes without benefit of money or organization.

With the Republicans leading the attack, the anti-Truman coalition on Capitol hill delivered a heavy and incessant barrage against the administration during the second session of the 79th congress, which convened in Jan. 1946. The Democrats' weak points were deliberately selected in the parliamentary battle.

In framing a measure for extension of OPA, Sen. Taft and Sen. Kenneth Wherry of Nebraska, minority whip, forced adoption of amendments allowing greater profits

to producers and processors. Although his congressional aides urged him to sign the bill, President Truman vetoed it on the ground that "it would wreck OPA and cause inflation." His veto was upheld by a narrow margin.

Congress re-enacted a slightly modified measure, and the chief executive accepted it, albeit reluctantly. This statute provided for a "meat holiday" from OPA controls for two months—July and August—but it permitted administration agencies to reinstate price ceilings if production did not meet demand. It was generally believed that this provision proved politically damaging to the Democrats.

During the few weeks of decontrol, meat began to come into local markets. With the reimposition of controls on Sept. 1, however, a severe meat famine struck the nation's tables. Truman's own leaders begged him to remove meat ceilings, and the president reluctantly complied on Oct. 14. When supplies of beef, pork and lamb became more plentiful only a few days before the Nov. 5 election, the people apparently concluded that the administration's earlier insistence on retention of federal regulation had been a major miscalculation and blunder.

Angered by a series of strikes that increased prices and handicapped production, congress passed the Case bill, which imposed drastic curbs and responsibilities on labour. Pres. Truman vetoed the bill, proposing a general study of the labour problem instead and his veto was sustained by only five votes in the house. His alternative suggestion was not even considered, nor was his proposal for authority to induct into the armed forces any worker who struck against a key industry after it had been taken over by the government.

Truman's labour policy appeared to make enemies for the administration on all sides. Conservatives criticized him for his veto of the Case bill. Labour spokesmen, including C.I.O. President Philip Murray, branded him as an "enemy" because of his "draft" counter-proposal.

The G.O.P. also tried to capitalize on the charge that

the Democrats tolerated "communist" allies for vote-getting purposes. In senate and house, opposition leaders reiterated demands that "reds" and "pinks" be discharged from the federal pay roll. The Wallace episode (see DEMOCRATIC PARTY) as well as Moscow's recalcitrant behaviour at postwar peace conferences, operated to the disadvantage of the Democrats.

Republican National Chairman B. Carroll Reece summed up the campaign from his viewpoint with the comment that, "The outstanding issues are the three C's—communism, confusion and controls." Originating in Boston, the G.O.P.'s most punchy and appealing battle cry was: "Had enough? Vote Republican!" It swept the nation on waves of laughter.

It was a curious campaign. Whereas Democratic candidates for national office based their appeal on strictly local issues, Republican nominees for the most unimportant local positions relied on national issues and shortcomings for victory. The "ins" avoided any discussion of the administration at Washington, while their opponents talked the "three C's" almost exclusively.

Victory.—On Nov. 5, 1946, the accumulated grievances of 13 years, the war and postwar irritations and discord between the left and right wings of the Democratic party combined to produce a Republican landslide from coast to coast. It was one of the worst defeats that a major party had suffered in a mid-term test.

The Republicans regained absolute control of congress by substantial margins. They increased their senate membership from 39 to 51. They took back senate seats in such important and scattered states as Massachusetts, New York, Pennsylvania, Delaware, Ohio, Missouri, Wisconsin, Minnesota, Montana, Utah and Washington. They lost senatorial races by majorities of 2,000, 3,000 and 5,000 respectively, in Maryland, West Virginia and Wyoming.

The Republicans raised their representation in the house from 192 to 246. The Democrats retained 188 places, and the American Labor party had one—Vito Marcantonio of New York city. In addition to winning back the legislative branch, the G.O.P. increased the number of governorships held by their party to 25, or all but 7 outside the south and the border states. The opposition outvoted the Democrats in the congressional contests by 3,000,000. Most significantly, the Republicans carried great cities which had been swept by the Democrats since Roosevelt's appearance on the political scene.

Temporarily at least, the G.O.P. seemed to have won back numerous elements of the electorate which had been off the old reservation for many years, such as Negroes, populous racial groups, the small business men and white-collarites and also a large segment of the so-called workingman's vote.

The 1948 presidential spotlight immediately shifted in the direction of several prominent figures who won their respective contests by tremendous majorities, ranging from 400,000 to 700,000. They were Gov. Dewey of New York and Gov. Warren of California, who were re-elected. Others were Gov. Edward Martin of Pennsylvania and ex-Gov. Bricker of Ohio, who were advanced to the senate.

Two incumbent members of the senate also figured in 1948 speculation. The first was Sen. Vandenberg, who won re-election easily without even returning to Michigan; his role as foreign policy spokesman proved a great asset. The other was Sen. Taft, who had long held the leadership of the more conservative forces in the upper chamber.

When fear was expressed in the United States and elsewhere that the Republican triumph might mean a radical change in U.S. foreign policy, Sen. Vandenberg assured the

United Nations assembly at New York that the program would not be disturbed. Assembling at Washington immediately after the election, the Republican steering committees of house and senate promised a maximum of co-operation with Pres. Truman on domestic questions.

Despite some members' complaint that a few veterans were "monopolizing" the leadership posts, senate Republicans of the 80th congress put through their prearranged slate, as follows: president pro tem, Sen. Arthur H. Vandenberg of Michigan; majority leader, Sen. Wallace H. White, Jr. of Maine; chairman of the steering and policy committee, Sen. Robert A. Taft of Ohio; chairman of the conference committee, Sen. Eugene D. Millikin of Colorado.

Former minority leader Joseph W. Martin Jr. of Massachusetts was elected speaker of the house by unanimous vote. Rep. Charles A. Halleck of Indiana was selected as majority leader. (See also ELECTIONS; UNITED STATES.)

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Research Libraries, Association of

See SOCIETIES AND ASSOCIATIONS.

Resins

See PAINTS AND VARNISHES; PLASTICS INDUSTRY.

Retail Sales

See BUSINESS REVIEW.

Réunion

See FRENCH COLONIAL EMPIRE.

Reuther, Walter Philip

Reuther (1907–). U.S. labour leader, was born Sept. 1, in Wheeling, W.Va. The son of a trade unionist, he studied at Wayne university (Detroit) for three years and then, with his brother, Victor, toured (1933-35) France, Germany, Italy, the soviet union, China and Japan to study labour conditions. On his return to the U.S., he worked in small tool and die shops and organized and became president of the United Automobile Workers Local 174, which embraced employees of a number of small plants.

Reuther organized the successful sitdown strikes in the Detroit automobile and related industries (1936-37) and was named one of the union's two vice presidents (1942). After keeping work stoppages at the General Motors plants to a minimum during World War II, he launched a post-war campaign to obtain higher wage levels. He demanded (Sept. 14, 1945) a 30% increase for U.A.W. workers in G.M. plants, contending that the corporation could grant this increase, reduce motor car prices substantially and still make large profits. The corporation's rejection of these demands resulted in a strike starting Nov. 21, in

which upwards of 180,000 U.A.W. union members in G.M. plants throughout the country quit work. Reuther's proposals that G.M. open its books to determine the company's ability to pay the 30% increase were rejected by the corporation which said Dec. 20, that compliance would lead to "the death of the American system of competitive enterprise." The strike continued for 113 days before it was settled March 13, 1946, after Reuther agreed to an 18½ cent hourly pay increase and adjustments in overtime and vacation pay.

After the strike, Reuther was elected president of the U.A.W., March 27, by a narrow margin over his predecessor, R. J. Thomas; but his victory was incomplete as nearly two-thirds of the seats on the union's international executive board went to his political foes.

Revenue Acts

See LAW; TAXATION.

Rexists

See BELGIUM.

Reynaud, Paul

Reynaud (1878–), French statesman, was born Oct. 15, 1878, at Barcelonnette in the Basses-Alpes department. He received his doctorate of law from the University of Paris in 1904 and served throughout World War I, receiving the *croix de guerre*. Elected to the chamber of deputies from the Basses-Alpes in 1919, he held a number of important ministerial posts in conservative French governments from 1930 to 1940. One of the few "voices in the wilderness" who warned Frenchmen against placing reliance in the Munich pact or Hitler's assurances, he succeeded Daladier as premier on March 21, 1940. Seven weeks later (May 10), German armies started their surprise attack on the Low Countries. The successive defeats of the French armies caused near-panic and hysteria in the French government. Striving vainly to bolster morale, Reynaud on June 6 reshuffled his cabinet. But the government evacuated Paris, June 10, moving to Tours and then to Bordeaux, June 14.

Reynaud resigned June 16 and was succeeded by Marshal Henri Pétain. After the armistice, Reynaud, along with other officials of the fallen Third Republic, was imprisoned by the Vichy government. In Nov. 1942, he was transferred to a German prison. Liberated in May 1945, by Allied troops, he returned to Paris and appeared as a prosecution witness in the trial of Pétain. Taking the stand, July 23, 1945, Reynaud asserted that he had been determined to carry on the war from Africa, but that he was afraid to buck Pétain, who opposed the plan. Reynaud was elected to the new constituent assembly June 2, 1946, and to the national assembly on Nov. 10, 1946.

RFC

See RECONSTRUCTION FINANCE CORPORATION.

Rheumatism

See ARTHRITIS.

Rhineland

Together with the neighbouring province of Westphalia, the Rhineland forms the most important industrial section of Germany and the indispensable economic basis of German military power. Its population in 1933 was 8,453,063 (area, 9,462 sq.mi.). Some of the largest cities in

the Rhineland are: Cologne (768,426 in 1939), Essen (659,871), Duesseldorf (539,905), Dortmund (537,000), Duisburg (431,256), Wuppertal (398,099), Gelsenkirchen (313,003), Bochum (303,288).

The chief part of the Westphalian basin and the hub of the German iron and steel industry is the valley of the Ruhr, a right bank tributary of the Rhine.

The Rhineland and Westphalia became part of Prussia in 1815. After World War I, to ensure fulfilment of the peace treaty, Allied troops occupied the left bank and the bridgeheads of the Rhine. In addition, to safeguard French security, the German territory west of the Rhine was to be permanently demilitarized. The occupied territory was to be evacuated in three stages in accordance with the fulfilment of the treaty; the right of reoccupation was reserved in the event of default. Originally the occupation was supposed to end in 1935; in reality the third and final zone of occupation was evacuated on June 30, 1930. German default in reparation payments led to a brief occupation by the French and Belgians of the Ruhr in 1923. In the treaty of Locarno in 1925 the Germans promised to respect the demilitarization of the Rhineland. Though Chancellor Hitler repeatedly stressed his adherence to the Locarno treaty, he broke his pledge in March 1936 and began to remilitarize and fortify the Rhineland. In World War II the Rhineland and Westphalia were heavily bombed. In 1945 the territory fell mostly into the British zone of occupation.

To avoid the renewed danger of German aggression the French government in 1945 insisted repeatedly to the other three occupying powers that a special regime for the Rhineland and Westphalia should be created. By such a regime not only was the security and peace of western Europe to be assured but also the industrial resources of the territory could become important factors in the economic reconstruction and integration of western Europe. The French considered definite arrangements for the western borders of Germany the more urgent because the eastern borders of Germany had been settled at the Potsdam conference.

(H. Ko.)

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Rhine River

See CANALS AND INLAND WATERWAYS.

Rhode Island

A north Atlantic state of the United States, in New England, Rhode Island is one of the 13 original states, popularly known as "Little Rhody." Area, 1,214 sq.mi. (smallest in the United States). Population (1940) 713,346, of whom 653,383 (91.6%) were urban. On July 1, 1944, the bureau of census estimated the population of the state at 778,972. Capital, Providence (253,504). Other cities: Pawtucket (75,797); Woonsocket (49,303); Cranston (47,085); Newport (30,532); Warwick (28,757); Central Falls (25,248).

At the regular 1937 session of the legislature, the gasoline tax was increased from two to three cents per gallon. A special commission was created to study the tax structure of the state. Acts provided strict regulation of child marriages, created a commission to study juvenile court procedure, ordered children between the ages of 7 and 16 to attend school regularly, and regulated traffic in alcoholic beverages. The most important political event of 1937 was the contest between Governor Robert E. Quinn and Walter O'Hara, manager of the Narragansett race track.

The climax was reached in the governor's proclamation of martial law effective in the vicinity of the track and his order closing the track for the latter part of the racing season.

At the 1938 session of the legislature, leading acts passed were annual appropriation bills totalling \$15,997,413; authority for holding special election for sanction of federal public works loans; an act relating to the holding of caucuses and elections; an act requiring blood tests before marriage; authority to Pawtucket to construct sewage disposal facilities; adding Jamestown ferry to the state highway system; an act to regulate practices of professional engineering; prohibition of use of tear gas during labour strikes or lockouts; an act to provide aid to the blind. State officers elected in Nov. 1938 were: William H. Vanderbilt, governor; James O. McManus, lieutenant governor; J. Hector Paquin, secretary of state; Louis V. Jackvony, attorney general; Thomas P. Hazard, general treasurer.

Important measures passed at the regular 1939 session of the legislature included an act reorganizing state departments by revising the reorganization act of 1935; an act creating a civil service system and a resolution proposing a civil service amendment to the constitution; an act allowing the mayor of Providence greater appointive power and providing for a charter commission to draft a charter revision for Providence; an act appropriating funds for investigation of voting frauds; acts creating commissions to study juvenile and district court legislation, election and caucus laws, direct primary and corrupt practices acts, labour legislation, division of Providence into five senatorial districts; an annual appropriation bill reducing state expenditures by more than \$1,000,000; acts levying a tax on cigarettes and all other tobacco products, increasing inheritance tax and rates for taxes on electric and communication utilities; an act exempting idle industrial properties from local taxation; an act creating a board of trustees for state colleges; an act ceding land to the federal government for a naval air base; and a resolution proposing a constitutional amendment banning dual office-holding.

Elected at the Nov. 1940 elections to the chief executive offices for 1941-42 were: J. Howard McGrath, governor; Louis W. Cappelli, lieutenant governor; Armand H. Cote, secretary of state; John H. Nolan, attorney general; Russell H. Handy, general treasurer. In the 1940 presidential elections Roosevelt received 181,122 votes; Willkie 138,214; Browder 239; Babson 74.

At the regular 1940 session of the legislature, measures were passed giving Providence a fifth seat and Pawtucket a second seat in the state senate; granting Providence a new charter; providing for a referendum on a nonpartisan system of municipal elections in Providence; modifying the requirement for mandatory certification of cases to the supreme court from lower courts on constitutional questions; establishing uniform aeronautics laws; making appropriations for support of the state totalling \$15,180,983 for the fiscal year 1940-41; appropriating \$50,000 for the use of the attorney general's department in investigating election frauds; allowing Providence to issue \$1,000,000 in funding bonds and \$750,000 in bonds for school improvements; requiring cities and towns asking authority from the legislature to issue bonds to provide specific information on their financial condition.

Measures passed during the 1941 session of the legislature included the following: amendments to the civil service law, giving the governor power to replace the commission; an act creating a four-member bipartisan board of elections; an act giving housing authorities the right to exercise the power of eminent domain; an act creating a

council of defense and authorizing local and district councils; an act guaranteeing to persons entering the armed forces a maximum unemployment compensation of \$16 weekly upon their discharge, as long as they were unemployed or as long as their wage credits lasted; amendments to the workmen's compensation law, increasing allowances for medical care and changing the base for computing compensation; an act extending the emergency period for state unemployment relief for one year and providing penalties for accepting relief fraudulently; an act creating a state labour relations board; and a new law of arrest.

The chief executive officers of the state elected in 1940 were re-elected in Nov. 1942 for 1943-44 terms. In the 1942 gubernatorial election McGrath (Dem.) received 139,407 votes and his Republican opponent, McManus received 98,741. Edmund W. Flynn was chief justice of the supreme court.

At the 1942 legislative session, measures were passed providing for absentee registration for service men; permitting citizens in the armed forces to vote by absentee ballot; granting leave of absence to state employees entering the armed forces or loaned to federal agencies; authorizing housing authorities to convert slum clearance projects to defense housing projects; giving general authorization to cities and towns to appropriate for civilian defense needs; granting emergency defense powers for the governor and state council of defense; placing the state sickness insurance system under the unemployment compensation board; providing for an increase of about 12½% in unemployment compensation benefits; providing for reduction of employee contributions to the unemployment compensation fund from 1½% to ½% of the individual's wages, the 1% being diverted to the new state sickness insurance fund.

In 1943 the legislature enacted measures extending the governor's emergency war powers for a year; exempting residents of the state from payment of interest on delinquent property taxes while in military service; providing penalties for an employer who refused to restore a job to a member of the armed forces if the member applied within 40 days of discharge and the employer was in a position to rehire him; appropriating \$20,000 to establish canning centres to tie in with the food conservation program; creating a commission to study the matter of bonuses for service personnel; authorizing state prisoners to participate in war production; regulating hours and conditions of employment of women and minors; creating a second injury indemnity fund; setting up a curative centre for injured workmen; making appropriations of \$17,759,970 for the support of the state for the fiscal year ending June 30, 1944; increasing from 3% to 4% the excise tax on financial institutions; placing a tax ceiling of 27.5 cents on each \$100 of deposits in credit unions; revising the unincorporated business tax; authorizing cities and towns to set up reserve funds to be spent on capital expenditures after the war; opening a specific area of the Sakonnet river to power dredging and providing for the opening of a comparable substitute area in Narragansett bay when the Sakonnet river became over-fished; providing for the conservation of soil and forest resources and the prevention and control of erosion.

Principal executive officers of the state elected in Nov. 1944 were J. Howard McGrath, governor; John O. Pastore, lieutenant governor; Armand H. Cote, secretary of state; John H. Nolan, attorney general; Russell H. Handy, general treasurer. In the presidential election, Roosevelt re-

ceived 175,356 votes; Dewey 123,487. No U.S. senatorial election was held. Edmund W. Flynn was chief justice of the supreme court.

The 1944 legislature enacted laws creating a separate juvenile court; authorizing a 1/2% increase in the tax on pari-mutuel betting; levying an additional tax on electric utilities; designating annual appropriations and special appropriations of \$50,000 for aid in planning postwar bridge and highway projects and \$58,450 for 19 charitable organizations; granting extension of the governor's emergency war powers for another year; permitting service personnel to vote on absentee ballots without registering; moving up the time for filing final nominations for federal

and state officers to July 10; recodifying the public assistance laws; creating a Rhode Island port authority; giving the public utilities administrator full control over intrastate commercial aviation; providing that absence in military service was not to affect continuity of employment; providing for a constitutional convention; providing for assistance to dependents of servicemen; authorizing the governor to offer to convey state property to the federal government for the erection of a veterans' hospital.

Governor McGrath resigned Oct. 6, 1945, to accept appointment as solicitor general of the United States and John O. Pastore became governor. Leading measures passed by the 1945 legislature included those giving seniority employment benefits to veterans of World War II; providing for establishment of veterans' retraining and re-employment committees and information service centres; providing for incorporation of nonprofit medical service corporations; providing for mandatory retirement of members of the state police force after 20 years; imposing an additional tax on the gross earnings of electrical corporations; granting annual appropriation of \$19,360,843 for support of the state government for the fiscal year beginning July 1, 1945; making available an additional \$1,000,000 for the relief of cities and towns in the state. Principal executive officers of the state elected in Nov. 1946 for 1947-48 were John O. Pastore, governor; John S. McLernan, lieutenant governor; Armand H. Cote, secretary of state; John H. Nolan, attorney general; Russell H. Handy, general treasurer. (M. C. ML.; X.)

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Rhode Island: Statistical Data

Table I.—Education (Public)

	1938	1941	1942	1943	1944	1945
Elementary school pupils . . .	90,895	62,856	61,625	60,216	58,196	57,185
High school pupils . . .	28,264	4,754	44,321	41,344	38,852	37,862
Elementary teachers . . .	2,252		2,154	2,115	2,049	2,000
High school teachers . . .	1,756	4,212	1,997	1,891	1,836	1,803

Table II.—Public Welfare
(Money figures in thousands of dollars)

	1937	1938	1939	1940	1941	1944
Cases on general relief . . .	13,300	9,600	10,000	10,500	5,600	
Cost of general relief . . .	\$372	\$281	\$287	\$282	\$138	
Recipients of old-age pensions		6,247		6,772	6,976	
Dependent children receiving aid		2,836		3,270	3,730	
Blind receiving aid		50		65	84	
Workers under unemployment compensation . . .		175,978	187,723	190,400		
Prisoners	581	564	500		910	707

Table III.—Communications
(Money figures in thousands of dollars)

	1937	1938	1939	1941	1942	1944	1945
Highway mileage . . .		781	836	802	801	809	810
Expenditures on highways . . .	\$6,390	\$7,548	\$7,934	\$3,431	\$3,154		
Railroad mileage . . .	202	194	194	138	188	185	185

Table IV.—Banking and Finance
(Money figures in thousands of dollars)

	1937	1939	1941	1943	1944	1945
State revenue . . .	\$21,957	\$26,253	\$18,530	\$22,980	\$21,868	\$21,916
State expenditure . . .	22,802	20,786	18,315	20,168	20,531	21,624
State net debt . . .	26,966		25,303	22,633	21,466	21,357
State gross debt . . .	33,018		30,766	28,363	27,593	25,327
Number of banks . . .	35	35	35	35	34	35
Total bank deposits . . .	\$475,800	\$479,500				
Number of national banks	12	12		12	11	11

Table V.—Agriculture
(All figures in thousands)

	1937	1939	1940	1942	1944	1945
Acreage, principal crops	60	62	61	50	50	51
Income from crops and livestock . . .	\$9,500	\$9,826	\$10,061	\$15,370	\$16,418	\$16,500 (est.)
Leading crops (bu.):						
Apples	286	275	267	332	268	85
Corn	400	410	369	42	288	378
Hay (tons)	57	52	56	51	39	50
Oats	60	62	60	34	30	32
Potatoes	838	779	878	975	1,235	1,276

Table VI.—Manufacturing
(Money figures in thousands of dollars)

	1937	1939	1943	1944	1945
Wage earners	108,031	106,275	84,463	75,673	102,335
Wages paid	\$112,933	\$105,407			
Value of products	517,196	516,391			
Leading manufactured products (value):					
Woolen and worsted	136,916	128,543			
Dyeing and finishing	29,259	41,497			
Cotton	38,959	35,622			
Rayon	25,760	30,207			
Machinery	20,114	26,910			
Jewellery	28,734	19,497			

Table VII.—Mineral Production
(All figures in thousands of dollars)

	1937	1939	1940	1942	1943	1944
Value of mineral production	\$863	\$981	\$995	\$836	\$808	\$612
Leading products (value):						
Stone	478	559	512	352	410	213
Sand and gravel	297	266	334	362	328	287

Rhodesia, Northern

Northern Rhodesia is a protectorate of the British crown. It extends from Southern Rhodesia northward to the boundaries of the Belgian Congo and of Tanganyika territory; it is bounded on the east by Nyasaland protectorate and on the west by Angola. Area: 290,323 sq.mi.; pop. (est. 1940): 1,381,800 of whom 15,188 European and 1,366,600 African. Chief towns: Lusaka (cap., Europeans: 1,350); Luanshya (Europeans 1,800; Africans 22,000); Ndola (1,000; 8,000); Mufulira (1,100; 12,500). Languages: English, Chiwemba, Chinyanja, tribal dialects. Religion: Anglican, Catholic, nonconformist, Hebrew and pagan. Governor: Sir Enbule John Waddington (after May 31, 1941).

The main feature of the years 1937-46 in Northern Rhodesia was the economic development of the country as a whole, to which an immense impetus was given by the wartime demand for copper, deposits of which in the protectorate are among the largest in the world. From 1938-1943, 1,385,914 short tons of copper were produced for the Allies. In the same period were mined 3,482 short tons of lead, 72,243 short tons of zinc and 3,687 short tons of vanadium. In 1940 two mica mines were started. Some trouble was made by native employees on the mines in 1942. Apart from that, the mines remained in full production throughout World War II until 1946, when European artisans went on strike for more pay. The burden of transporting the mines' output to the coast put a heavy strain on the Rhodesian railways. These had, in addition, to contend with a strike of native employees in Jan. 1946 which spread from Southern Rhodesia. In Aug. 1946 plans

were announced for a new copper refinery which would enable much of the processing to be done within the territory. Many thousands of Africans served in the British armed forces during the war. (For statistical data, see under RHODESIA, SOUTHERN.)

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(G. A. V.)

Rhodesia, Southern

A self-governing colony in South Africa, Southern Rhodesia extends from the Transvaal border northward to the boundaries of Northern Rhodesia; it is bounded on the east by Mozambique and on the west by Bechuanaland. Legislative power was vested in the king of England,

represented by a governor, while the executive power was vested in the governor, aided by an executive council. This council was chosen from a legislative assembly by the leader of the predominant political party, and ministers were appointed by the governor. The assembly was elected by popular vote. Africans qualified for enfranchisement in the same manner as Europeans. Area: 150,333 sq.mi.; pop. (1941 census): 1,448,393; (est. 1945): 1,576,310 of whom 81,470 European, 6,830 Asiatic and coloured, and the rest African. Chief towns: Salisbury (cap., 61,760); Bulawayo (39,817); Umtali (7,771); Gwelo (7,726). Languages: English, Afrikaans, various native languages. Religion: Anglican, Catholic, nonconformist, Hebrew, pagan. Governors: Sir Herbert J. Stanley (1934–1941); Sir Evelyn

Item	1938		1940		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate		£1 = \$4.899		£1 = \$3.83		£1 = \$4.035
NORTHERN RHODESIA						
Finance						
Government revenues	£1,594 (\$7,791)					
Government expenditures	£1,418 (\$6,932)					
National debt	£2,347 (\$11,475)					
Transportation						
Railroads		622 mi.				
Highways		5,932 mi.				
Minerals						
Copper		238,593 tons				
Cobalt		1,611 "				
Zinc		11,441 "				
Crops						
Tobacco		103,286 "				
Corn		20,613 "				
Livestock						
Cattle		628,500				
Goats		85,500				
Exports—Total	£10,037 (\$49,069)					
Copper	£8,770 (\$42,876)					
Cobalt alloy	£471 (\$2,302)					
Vanadic oxide	£279 (\$1,362)					
Imports—Total	£5,173 (\$25,291)					
Metals and metal manufactures	£2,514 (\$12,293)					
Textiles, yarn, and clothing	£575 (\$2,812)					
Minerals, pottery, glass, cement	£397 (\$1,939)					
Education						
Elementary and secondary						
European schools		18				
Students		1,320				
African schools		431				
Students		35,570				
SOUTHERN RHODESIA						
Finance						
Government revenues	£3,404 (\$16,642)		£6,672 (\$26,920)*		£10,281 (\$41,483)	
Government expenditures	£4,224 (\$20,650)		£4,763 (\$19,218)*		£9,884 (\$39,880)	
National debt	£12,247 (\$59,877)		£20,036 (\$80,847)*		£22,437 (\$90,535)	
Transportation						
Railroads		2,709 mi.				
Highways		1,588 mi.				
Communication						
Telephones		6,711				
Radio sets		8,445				
Minerals						
Gold		814,000 oz.		826,485 oz.		592,729 oz.
Asbestos		66,080 tons		...		55,293 tons
Coal		1,288,000 "		...		1,992,678 "
Crops						
Corn		143,189 tons				160,652 tons†
Tobacco		13,354 "				16,880 "†
Livestock						
Cattle		2,462,675		2,462,764		2,743,059†
Goats		752,000		648,000		702,148†
Forest products						
Railroad ties (exports only)	£86 (\$421)*	...				
Timber	£43 (\$208)*	285,074 cu.ft.				
Manufactures						
Total	£4,517 (\$22,083)	...	£7,705 (\$31,088)*	...		
Food	£1,679 (\$8,210)	...	£2,934 (\$11,837)*	...		
Metal	£626 (\$3,062)	...	£993 (\$4,008)*	...		
Tobacco	£411 (\$2,011)	...	£802 (\$3,235)*	...		
Exports—Total	£11,762 (\$57,503)	...	£15,598 (\$59,739)	...	£15,535 (\$62,685)	...
Gold bars	£5,642 (\$27,583)	801,000 oz.	£7,190 (\$27,539)	830,000 oz.	£4,885 (\$19,711)	590,000 oz.
Asbestos (raw)	£1,255 (\$6,136)	58,000 tons	£1,475 (\$5,650)	65,000 tons	£1,605 (\$6,476)	47,000 tons
Tobacco (unmanufactured)	£1,249 (\$6,105)	11,000 "	£2,050 (\$7,852)	15,000 "	£3,019 (\$12,180)	13,000 "
Chrome ore	£511 (\$2,498)	226,000 "	£896 (\$3,430)	345,000 "	£1,006 (\$4,058)	299,000 "
Imports—Total	£9,355 (\$45,739)	...	£9,688 (\$37,105)	...		
Railway material	£921 (\$4,502)	...	£701 (\$2,686)	...		
Machinery	£791 (\$3,866)	...	£120 (\$458)	...		
Apparel	£506 (\$2,475)	...	£260 (\$995)	...		
Education						
Elementary and secondary						
European schools		111		788		
Students		10,762		11,106		
Asiatic and coloured schools		12		12		
Students		11,462		1,834		
Native schools		1,283†		1,470*		
Students		108,995†		115,465*		

*1942. †1943. ‡1937. §1941.

Baring (July 28, 1942–1944); Admiral Sir William Campbell Tait (Nov. 20, 1944–died July 1946); Major General Sir John Noble Kennedy (after Sept. 15, 1946). Prime minister: Sir Godfrey Martin Huggins (after Nov. 14, 1934).

The year 1937 was chiefly notable for the three-party agreement between the Union of South Africa, Southern Rhodesia and the Rhodesian railways binding the union not to exercise its option on the Vryburg Palapye railroad for 33 years. In March 1939 the report of the royal commission on the amalgamation of Southern and Northern Rhodesia, known as the Bledisloe report, was published; in April at the general elections the United party gained 23 of the 30 seats in the general assembly; the same month the natural resources report was published, while later in the year the Umshandige dam and the Otto Beit bridge at Chirundu were both opened. In 1940 the first empire air training school was opened; on Sept. 12, the colony celebrated its jubilee and Bulawayo town hall was completed; in October the association of chambers of industry was formed. In 1941 the colony formed a trade pact with Australia; De Beers ceded its diamond rights concession and a trade commission visited the Belgian Congo. All women between the ages of 16 and 54 were compulsorily registered for national service in 1942, in which year the first airgraphs were sent to England and gasoline rationing started; in August Southern Rhodesian forces came under command of the Union of South Africa. In 1943 standard flour was introduced; in April the Pole-Evans report on pasture conditions was received; Bulawayo celebrated the 50th anniversary of the occupation of Matabeleland. In 1944 a central African council, consultative body of Southern Rhodesia, Northern Rhodesia and Nyasaland, was formed.

In May 1946 the Howitt report on state ownership of the railways was published. (G. A. V.)

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Rhodes Scholarships

Although Oxford continued to function as a university throughout the war, wartime necessities forced temporary discontinuance of the 32 Rhodes scholarships granted annually to U.S. men between the ages of 19 and 25. The group of U.S. scholars elected in 1939 did not go into residence until Oct. 1946. Elections were resumed in Dec. 1946, providing an additional 16 scholarships per year for 1946 and 1947. These 48 scholarships were divided between regular and war service candidates at the discretion of committees of selection. For war service candidates the age limit was extended and the usual restriction against marriage was relaxed. It was hoped that by this means men might compete who otherwise would have been deterred by wartime circumstances. (F. Ay.)

Ribbentrop, Joachim von

Ribbentrop (1893–1946). German foreign minister, was born April 30, 1893, at Wesel on the Rhine. Educated at a gymnasium near Metz, he went to Canada in 1910 as an independent merchant. He returned to Germany in 1914 at the outbreak of World War I. Enlisting in a Hussar regiment, he advanced to the rank of lieutenant colonel and was attached to the war ministry at the end of the

war. Following the Armistice, he returned to private business, becoming a prosperous wine merchant.

Ribbentrop joined the Nazi party in 1932 and in 1933 Hitler made him his foreign policy adviser. In 1935 Ribbentrop was promoted to minister plenipotentiary at large and in 1936 he was appointed ambassador to England. In presenting his credentials to King George V on Feb. 5, 1937, Ribbentrop instead of complying with protocol shot his arm out in Nazi salute and shouted, "Heil Hitler!" The incident caused considerable stir and amusement in London.

Five weeks before Hitler marched into Austria, Ribbentrop was made foreign minister (Feb. 4, 1938), superseding the more conservative old-line diplomat, Baron Constantin von Neurath. When Hitler occupied Austria, Ribbentrop, who was in London, assured Britain that Germany had intervened in that country only to prevent civil war; however, on March 13, 1938, he signed the law incorporating Austria into the German Reich. The German foreign minister, who endorsed Hitler's plans for eventual dismemberment of Czechoslovakia, kept in touch with Sudeten leaders, instructing them to make the Sudetenland a burning issue. After Munich, he continued to exert strong pressure on Czechoslovakia and was present at the conference on March 14–15, 1939, in which Hitler, threatening invasion, forced President Emil Hacha to submit to German occupation. After the Wehrmacht marched into Czechoslovakia, Ribbentrop signed the law establishing a Reich "protectorate" over Bohemia and Moravia.

His role in the diplomatic manoeuvring that led to the attack on Poland was both active and energetic. Entering secret negotiations with the Soviet Union, he had arranged the German-Soviet pact—the antithesis of the anti-Comintern pact he authored in 1936—and on Aug. 24, he flew to Moscow to sign the new treaty.

Ribbentrop, who was always at Hitler's side in the many conferences presided over by the German dictator in 1940, had been advised in advance of Wehrmacht preparations to attack Norway and Denmark. He also prepared official memoranda to justify the German invasions and on April 27 he exhibited what he declared to be incontrovertible evidence that Britain had planned the invasion of Norway. In 1940, he also signed pacts extending the Rome-Berlin axis to Japan and several minor satellites, such as Hungary, Rumania and Slovakia. This was Ribbentrop's year of triumph.

German military reverses later made it more difficult for him to wrest concessions from the satellite states. On Aug. 6, 1943, he unsuccessfully tried to convince Pietro Badoglio to remain with the axis. In 1944 he watched most of the smaller satellites fall away, and in 1945 he witnessed the Reich's final collapse.

After Hitler's suicide, the new Fuehrer, Grand Admiral Karl Doenitz, ousted Ribbentrop as foreign minister, May 2, 1945. Six weeks later, on June 14, Ribbentrop was captured in a Hamburg rooming house by British troops. He was indicted as a war criminal and was one of the principal Nazi defendants at the Nuernberg war crimes trial that opened Nov. 20, 1945. Found guilty on four principal counts, he was executed at Nuernberg prison on Oct. 16, 1946.

In his defense, Ribbentrop said that all the important decisions were made by Hitler and that he was such a great admirer of the Fuehrer that he never questioned the latter's motives. In a written interview given to the press (Dec. 9, 1945), he declared that he "always stood for a policy of peace," that he worked for seven years for a German-English alliance and that he opposed war with Russia.

Rice

World rice production was increasing at the beginning of the decade 1937-46 but began to decline with the outbreak of World War II in 1939. The 1936-37 production was estimated at 7,105,500,000 bu., but by 1945-46 the crop was only 6,200,000,000 bu.—a decline of nearly 20% compared with the prewar average of 1935-39. Almost all the reduction was in Asia, where 95% of the world's rice had been produced. The decline in China was particularly severe, and the production in Japan and in the Japanese-dominated countries of Siam and French Indo-China was estimated to be about 60% of the prewar level. In Japan, the crop was down to 70%. India increased rice production in 1943-44, but had always been a large importer of rice, which averaged 3,200,000,000 lb. in prewar years. The loss of imports was very serious and every effort was made to "Grow More Food." Large quantities of wheat were imported to make up for the rice shortage. The increased production in North and South America helped to meet the shortage, but it supplied only a small proportion of the world's needs.

Production in southern Europe was sharply reduced in 1942-43, most of the decline being in Italy.

The amount of rice moved in international trade declined from an average of about 13,000,000,000 lb. in prewar years to 3,500,000,000 lb. in 1944. About 90% of the prewar trade originated in Burma, French Indo-China and Siam, while exports from the western hemisphere amounted to only about 3% of the total. By 1944 the west was providing about 30% of the total exports. The distribution of rice was under the Combined Food board, and prices were controlled by government purchase arrangements.

World rice supplies were not expected to become adequate until two or three years after the war's end.

The U.S. rice-growing industry became established at a new high level in the decade 1937-46. The expansion of rice production was gradual from 1898, when the domestic crop first became equal to imports, until 1920, when the first crop exceeding 50,000,000 bu. was harvested; the latter record was not equalled again until 1937.

The acreage devoted to rice in the United States increased slowly to 1,299,000 ac. in 1920 and then continued at from about 850,000 to 1,000,000 ac. until 1937. This acreage was divided between California, with 149,000 ac. in 1937, and Louisiana, Texas and Arkansas, with 967,000 of the total 1,116,000 ac. Total U.S. acreage rose in 1942 to 1,483,000 ac. and continued high through 1946, when the record was 1,506,000 ac. Acreage and yield fluctuated widely from year to year because of the variable supply of water for irrigation and differing weather conditions at planting and harvest time. The yields in both California and the southern belt increased steadily from 1926, the gain being greater in California than in the south but with wider fluctuations, until 1941, when there was a sharp drop in both areas. In 1937 the average yield in California was 61.5 bu. per ac. and in the southern states 45.8 bu. per ac. In 1941, California's output dropped to 55 bu. per ac. and that of the south to 38.7 bu. per ac. Neither region got back to the level of 1940 by 1946. For the whole country, the average yields were: 1937, 49.1 bu. per ac., and 1946, 45.4 bu.

U.S. production increased from 53,422,000 bu. in 1937 to an average of more than 70,000,000 bu. in 1944-46.

Prices of rice to U.S. producers were fairly stable from 1933 to 1939, when a rapid advance began. California and southern rice prices followed the same general trends but were quoted differently. Southern rice returned to producers about \$2.30 per barrel of 162 lb. in 1937 and rose to more than \$6.50 per bbl. in 1945. At the same time California rice sold for about \$1.40 per 100 lb. in 1937 and \$3.50 in 1945. The average price for all areas in 1937 was 65.8 cents per bu. and \$1.78 per bu. in the high price year 1943. Exports of rice exceeded imports after 1917 except in two years—1925 and 1936. Exports increased from 11,165,000 bu. in 1937 (against 3,828,000 bu. of imports) to 17,870,000 bu. in 1943. Shipments to U.S. territories were also large. The total of shipments and exports to other countries amounted to an average of 26,400,000 bu. in the years 1940-44, compared with 22,200,000 bu. in 1937-39.

In 1937 the U.S. rice crop was divided as follows: 28,200,000 bu. for civilian consumption, 3,915,000 bu. for seed and feed, 10,730,000 bu. for export, 11,920,000 bu. for shipment to possessions and 5,290,000 bu. into stocks for carryover. By 1944 this had changed as follows: 23,590,000 bu. for civilians, 13,870,000 bu. for military and lend-lease, 4,280,000 bu. for seed and feed, 16,370,000 bu. for export and 9,990,000 bu. for shipments with only 2,570,000 bu. for stocks. Civilian consumption of rice averaged 5.7 lb. in 1935-39 and about the same in 1946, since the increased production just about met the greater demand.

U.S. Rice Production by Leading States, 1937-46
(In millions of bushels)

	1937	1939	1941	1942	1943	1944	1945	1946
U.S. Total . . .	53.4	54.0	51.3	64.5	64.8	70.2	70.1	68.8
Louisiana . . .	20.6	21.3	20.4	23.3	21.7	21.3	23.0	21.5
Texas . . .	13.0	15.1	11.5	15.9	16.6	17.2	18.0	16.4
California . . .	9.1	9.0	8.4	12.6	14.5	15.0	14.5	15.5
Arkansas . . .	10.5	8.5	10.9	12.6	11.8	14.5	14.6	15.3

(J. C. Ms.)

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Richardson, James Otto

Richardson (1878—), U.S. naval officer, was born Sept. 18, 1878, at Paris, Tex. A graduate from the U.S. Naval academy (1902), he held numerous high naval posts and on Jan. 6, 1940, was named commander in chief of the U.S. fleet. He supervised the naval war manoeuvres in the Pacific and conferred on the results of the manoeuvres with President Roosevelt in July of that year. The following Oct. he also had strategy meetings with the president, Sec. of the Navy Frank Knox and naval officials. He was succeeded Feb. 1, 1941, as commander in chief of the fleet by Rear Adm. Husband E. Kimmel.

Richardson, who retired with the rank of admiral on Oct. 1, 1942, was called back to active duty during World War II and was a member of the navy's general board, 1941-42. In May 1944, he was appointed to the joint army-navy committee investigating merger proposals. He caused a sensation at the hearings of the Pearl Harbor congressional investigating committee, Nov. 19, 1945, with the charge that he was removed from his command following a dispute with Pres. Roosevelt over fleet disposition. Richardson asserted he wanted to shift the fleet to the west coast but that the president insisted that it be kept at Pearl Harbor to restrain Japan. The admiral subsequently testified that Knox told him in March 1941 that he was relieved of his command because he (Richardson) had "hurt Pres. Roosevelt's feelings."

784 Rickenbacker, Edward Vernon

Rickenbacker (1890–), U.S. air line executive, was born Oct. 8, 1890, in Columbus, Ohio. An auto racer, he entered the U.S. army in World War I. Assigned to the air force, he was promoted to captain of the 94th aero pursuit squadron and shot down 26 German planes in battle. He was awarded the congressional medal of honour for shooting down two and routing five of seven German planes that attacked him over France in Sept. 1918. After the Armistice, he entered the motorcar business, eventually joining General Motors as an executive. Later, he became president of Eastern Air Lines, Inc.

During World War II, he went to England (1942), to study the quality of foreign aircraft in comparison with U.S. models. While flying across the Pacific ocean on a similar mission to the far east, his plane ran out of fuel on Oct. 21, 1942, and he was virtually given up for lost. After floating 23 days at sea, north of Samoa, he and his crew were picked up by a navy flying boat and brought to a base in the South Pacific for hospitalization. On recovery, he returned to the United States.

Returning to public life, Capt. Rickenbacker attracted much attention when, in an interview Feb. 14, 1943, he declared that he opposed both overtime pay and President Roosevelt's proposal that net salaries be limited to \$25,000 annually. Limitation of salaries, he warned, would shackle initiative, which he termed as "one of the great cornerstones of American business." Later that year, he made a 55,000-mi. tour of the fighting fronts which included a visit to Moscow. On his return to the U.S. in Aug. 1943, he asserted that politically the U.S.S.R. had been "constantly turning to the right."

Rickets

See MEDICINE.

Rio de Janeiro

The federal capital of the United States of Brazil had an area of approximately 60 sq.mi. in 1946, within a federal district of 430 sq.mi., and a population which grew from 1,780,000 in 1937 to an estimated 1,951,900 in 1945. The city occupies a strip of land between the Tijuca mountains and the Guanabara bay and spreads up the slopes of the surrounding hills. It is governed by a mayor (*prefeito*) appointed by the president of the republic, and a federal district council elected by the inhabitants. During the decade 1937–46, Rio de Janeiro had the following mayors: Olynto de Melo (1935–38); Henrique de Toledo Dods-worth (1938–45); and Philadelpho de Azevedo (after 1945).

As the capital of Brazil, Rio de Janeiro witnessed many events of historical significance in the years 1937–46. At the end of 1937, a short-lived uprising of fascist elements gave President Getulio Vargas the opportunity to proclaim a state of war, dissolve both houses of congress and promulgate a new constitution. Vargas was overthrown by an uprising of the army in the capital during the night of Oct. 29–30, 1945; forces from Rio de Janeiro barracks occupied strategic points in the city and surrounded the presidential palace of Guanabara. A group of officers then visited Vargas and compelled him to resign.

During the Vargas regime there were many outstanding improvements of the city. A new avenue, known as Avenida Presidente Vargas, was opened perpendicular to the Avenida Rio Branco. The new thoroughfare, 260 ft. wide and about 2 mi. long, was built to serve the northern sub-

urban districts. Various new public buildings were constructed, among them the monumental ministry of war, the ministry of education and public health, the ministry of finance and the station of the central railroad of Brazil.

During World War II and as a consequence of the scarcity of gasoline and coal, the transportation facilities of the city were badly disorganized. Nevertheless, the outlying residential districts continued to develop very rapidly. With the increase of the population, to which the arrival of many wealthy European refugees greatly contributed, the housing problem became acute. New apartment houses were constructed, especially in the Flamengo, Botafogo, Copacabana, Leblon and Laranjeiras districts. Many of these buildings were owned co-operatively, and it was said that apartments were bought and sold for speculative purposes several times in succession before they were ever occupied. The prices of the apartments reached fabulous heights, four and five times the original sum.

At the end of 1946 the scarcity of foodstuffs and the high cost of living led to food riots, strikes and protest meetings of students in the capital.

On April 30, 1946, President Eurico Dutra closed all casinos throughout the country, depriving Rio de Janeiro alone of almost \$5,000,000 in yearly revenue derived from gambling, and putting an estimated 70,000 persons out of work. This action was taken because gambling, which had assumed extraordinary proportions, was allegedly taking the hard-earned money of many who couldn't afford it.

Rio de Janeiro was the seat of numerous national and international gatherings during the period, among them the Second Conference of Ministers of Foreign Affairs of the American Republics (Jan. 1942); the First Inter-American Congress of Medicine (Sept. 1946); the Second Pan American Congress of Mining Engineering and Geology (Oct. 1946). The Inter-American Conference on the Maintenance of Continental Peace and Security, scheduled to meet at Rio de Janeiro during 1946, was postponed indefinitely because of the international political situation.

(R. D'E.)

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Rio de Janeiro Conference, 1942

See PAN-AMERICAN CONFERENCES, 1937–46.

Rio de la Plata Conference

See PAN-AMERICAN CONFERENCES, 1937–46; URUGUAY.

Rio Muni

See SPANISH COLONIAL EMPIRE.

Ríos Morales, Juan Antonio

Ríos Morales (1888–1946), Chilean statesman, was born Nov. 10, 1888, in Cañete, Chile. He studied law and was admitted to the bar in 1914. Four times elected to the national congress as a radical deputy, he was twice president of his party. In 1932 he became minister of the interior in the Arturo Alessandri cabinet and later was minister of justice.

He was elected to the presidency of Chile on the radical ticket in Feb. 1942, during a critical period in World War II. Although reluctant at first to break off diplomatic

relations with Germany, presumably because of his country's long and vulnerable coast line, his government finally broke with the axis on Jan. 20, 1943. He postponed a projected trip to the United States in 1942 at the invitation of President Roosevelt after Sumner Welles, then assistant secretary of state, declared that axis agents were operating freely in Chile and Argentina and were transmitting news of the United Nations ship movements to axis submarines. In a subsequent message, however, President Ríos told Roosevelt that Chile "has been and will be at every moment at the side of the democracies." President Ríos made his long-delayed official visit to the United States in Oct. 1945, visited President Truman at the White House and then toured Canada, Mexico, Central America and west coast countries of South America. He died June 27, 1946.

Ritchie, Neil Methuen

Ritchie (1897–), British army officer, was born July 29, 1897. Educated at the Royal Military college at Sandhurst, he entered the army at the age of 17 as second lieutenant in the famous Black Watch regiment (42nd Highlanders). During World War I, he served on the western front and in Mesopotamia and Palestine. Wounded in action, he was awarded the distinguished service order and the military cross.

Ritchie, who ranked as a brigadier in 1939, was an acting major general by Oct. 1940. Deputy chief of the middle east general staff, he was appointed, Nov. 26, 1941, commander of the British 8th army in Libya, succeeding Sir Alan Gordon Cunningham. In June 1942, Ritchie's armoured units fell into an ambush laid by Marshal Erwin Rommel's Afrika Korps. In the ensuing battle, Ritchie lost nearly all of his armour and his armies were battered back into Egypt. On June 25, he was replaced by Gen. Claude J. E. Auchinleck. Ritchie was a corps commander in France in 1944 and became commander in chief of the Scottish command in 1945.

Rivers and Harbours

Improvements and maintenance of rivers, harbours, and other waterways of the United States and its islands and territories for navigation, were made a function of the

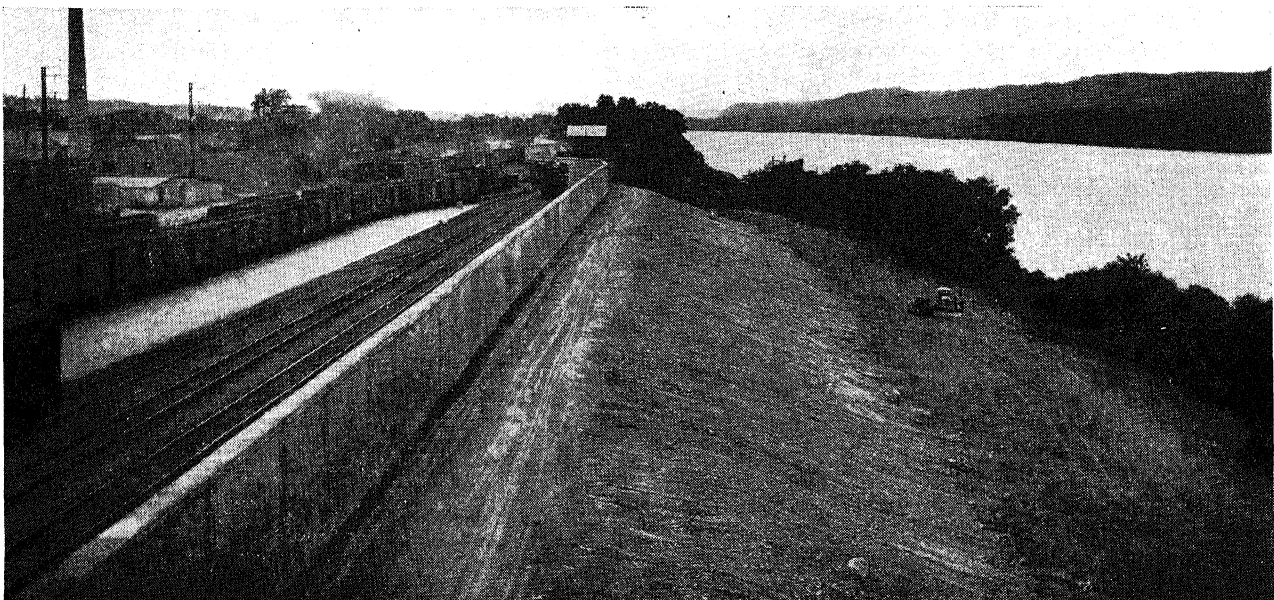
corps of engineers, U.S. army, under the direction of the secretary of war and the supervision of the chief of engineers, by an act of congress approved April 30, 1824. Though work on all projects not essential to the war effort was disrupted during World War II, the ten-year period 1937–46 proved one of the most progressive decades for rivers and harbours improvements for national benefits in the country's history.

In 1936 there were approximately 1,000 river and harbour projects in force, and active operations were under way on 342 of these projects. The amount expended in the maintenance and improvement of river and harbour works for the year was \$178,829,396.50. Major projects included the canalization of the Upper Mississippi river to provide a nine-ft. channel for barge navigation; continued construction of Fort Peck dam on the Missouri river in Montana, and the Bonneville dam on the Columbia river in Oregon, both primarily for improved navigation purposes, with electric power and flood control as additional benefits; major improvements at ports and harbours on the Atlantic, Pacific and Gulf coasts, and on the harbours and connecting channels with the Great lakes; enlargement of the Cape Cod canal to a depth of 32 ft. and widths of 500 ft. and greater; widening and deepening to 27 ft. of the Chesapeake and Delaware canal to provide facilities for ocean-going vessels; the construction of new locks and dams on the Illinois waterway at LaGrange and Peoria, Ill., to insure a stabilized channel of 9 ft. in depth; and the enlargement of the New York State Barge canal to a depth of 14 ft. from the Hudson river, 187 mi. to Oswego on Lake Ontario. Equally important projects were the dredging and removal of wrecks and debris in the channels of all navigable streams.

In 1937 congress authorized 141 new projects with a total estimated cost in excess of \$50,000,000. The following year, 1938, 52 additional projects were approved and preliminary examinations and surveys were ordered at 67 localities.

In 1939 and 1941 two of the four debris dams in the Sacramento valley, authorized in 1935, were completed. Both dams were placed in use for the storage of mining debris, the North Fork dam on the American river having a debris storage capacity of 26,000,000 cu.yd., and the

Ohio river flood barrier, completed in 1939 to protect the commercial district of Huntington, West Virginia



Upper Narrows dam, a storage capacity of 118,000,000 cu.yd.

By 1940 new work was completed on 89 projects and materially advanced on 221 other projects. Maintenance operations were under way at 307 localities and expenditures during the fiscal year were \$113,200,000. Of this amount, \$70,700,000 was for new work.

In conformity with the U.S. national policy limiting wartime construction to conserve manpower, equipment and materials, the new work program for rivers and harbours after 1941 was restricted to improvements having direct importance to the war effort. However, construction essential to the prosecution of World War II was continued. For example, in 1943, improvements and maintenance operations were carried out on 323 separate projects, of which 6 were fully completed. The following new works were typical of the improvements accomplished:

The MacArthur locks on the St. Marys river at Sault Sainte Marie, Mich., begun in 1942, were completed in Aug. 1943. The installation of the initial generating unit of 35,000 kw. was completed and production of power commenced. At the Fort Peck dam, Montana, water impounded in the newly completed dam was released to augment the natural stream flow during low water periods, providing adequate channel depths for navigation; in the Missouri river and the Chain of Rocks section of the Mississippi river. Power units numbers one to eight, inclusive, were completed and placed in operation at the Bonneville dam on the Columbia river. The available rate capacity was 410,000 kw. The completed dam, navigation locks and fishways were maintained and operated during the year. The turning basin and widening of a section of the Cuyahoga river, Ohio, begun in 1942, was completed. Also completed was the west breakwater at Oswego harbour. Dredging in the Liberty Island and Red Hook Flats sections of New York harbour provided additional anchorage space. Extensive dredging operations were executed on the Intracoastal Waterway system, extending for more than 2,300 mi. along the Atlantic and Gulf coast; also at Portland harbour, Maine, in the Kennebec river, Maine, from the mouth to the ship building facilities at Bath, Me. In addition, channel and harbour improvements important to the war effort were effected on waterways and at ports on the Atlantic, Gulf and Pacific coasts, on inland rivers, and on the Great lakes.

Two special wartime projects of major character related to river and harbour operations undertaken by the

corps of engineers were the construction of a vessel fleet for the Defense Plant corporation, to augment available floating equipment for the barging of essential commodities; and the construction at Escanaba, Mich., of two large ore docks and the appurtenant facilities, for maintaining the flow of essential iron ore from the mines to furnaces.

Under an appropriation of \$4,000,000, provided in the second Deficiency Appropriation act approved July 5, 1945, advanced planning of river and harbour projects was pushed so that essential postwar river and harbour improvements could be resumed immediately upon cessation of hostilities. The total estimated cost of completing all authorized river and harbour projects determined necessary to the interest of commerce and navigation was placed at about \$581,500,000. Surveys were also completed on additional river and harbour projects, the estimated cost of the recommended work being in excess of \$2,000,000,000. The total backlog of authorized and recommended river and harbour projects was more than \$2,500,000,000.

The 1946 Deficiency bill provided \$15,000,000 for combined flood control and navigation improvement work on the Lower Mississippi river. It also provided \$25,516,000 for general rivers and harbours projects. Among the major projects begun or continued with these funds were the improvement of the Los Angeles and Long Beach harbours in California; the improvement and maintenance of the Mississippi River channel between St. Louis and Minneapolis; the improvement of the Pearl river in Mississippi and Louisiana; additional navigation work on the Missouri river at Fort Peck; continued work on the Monongahela river in Pennsylvania and West Virginia; additional work on the Great Lakes to Hudson river waterway; the improvement and maintenance of the Chesapeake and Delaware canal.

For the fiscal year 1946 congress authorized 292 new projects or modifications of existing projects at an estimated total cost of \$382,000,000. These additional improvements included a 12-ft. channel in the Intracoastal waterway from Jacksonville to Miami, Fla.; the improvement of the Apalachicola, Chattahoochee and Flint rivers in Georgia and Florida; and the development of the Alabama and Coosa rivers and tributaries in Alabama and Georgia.

The authorized navigation improvement of the Neches and Angelina rivers, Texas, provided for the construction of a reservoir in the Neches river, one in the Angelina river and two power regulating dams in the Neches river. Other rivers and harbours projects included the Guada-

Water-Borne Commerce of the United States
Comparative Statement of the Water-Borne Commerce of the United States, Eliminating All Known Duplications, by Calendar Years (In Thousands of Tons of 2,000 Lbs.)

Year	Grand adjusted Total*	Total Ports	Ports													Great Lakes			Domestic Receipts and Shipments Via New York State Barge canal and Illinois waterway			Rivers, Canals, and connecting channels		
			Atlantic, Gulf, and Pacific Coasts						Imports		Foreign Exports		Overseas via St. Lawrence		Lake- wise	Internal and local†	Internal	Barge canal	State Inter- nal	Via Illinois water- way	Total	Bulk	Package	
			Foreign		Domestic		From Canada	To Lawrence river	To Canada	To Lawrence river														
			Imports	Exports	Coast- wise	Other domestic																		
1936	525,842	470,460	37,507	37,154	132,367	125,058	5,090	333	10,065	98	115,102	7,390	\$296	+	+	276,300	255,500	20,800						
1937	583,100	545,581	43,764	52,909	149,417	138,397	3,772	330	13,580	57	134,751	7,957	\$647	+	+	313,300	289,500	23,800						
1938	466,900	448,824	33,886	55,476	138,478	122,683	4,925	185	10,642	69	72,778	9,567	\$135	+	+	277,800	254,000	23,800						
1939	569,400	526,684	37,854	57,711	150,890	138,744	4,736	205	12,049	112	113,309	4,912	185	2,213	3,856	329,400	303,600	25,800						
1940	607,900	577,233	40,740	49,568	156,831	155,547	4,102	15	16,822	7	141,103	5,276	196	2,550	4,476	366,800	324,900	23,900						
1941	653,600	623,837	54,616	40,605	155,857	170,340	4,623	5	20,784	19	163,161	6,723	70	2,179	4,855	422,223	403,299	23,924						
1942	589,900	542,820	25,974	46,023	73,977	183,609	4,414	74	22,715	21	172,606	6,102	78	2,416	4,811	423,336	402,170	21,166						
1943	580,581	546,719	33,077	63,086	59,789	186,655	7,049	71	23,999	3	159,458	6,551	219	1,947	4,815	389,722	374,133	15,589						
1944	605,928	591,528	39,441	82,613	70,784	187,319	8,055	—	23,627	—	164,971	7,106	23	1,825	5,764	402,731	385,615	17,116						
1945	618,906	605,594	44,526	100,333	90,691	170,886	6,511	—	20,723	2	157,900	7,480	14	1,843	4,685	394,204	374,874	19,330						

*Less than cross addition for reason that the ports and rivers are each credited with their respective total net tonnage, some of which is applicable to both ports and rivers. This duplication is eliminated in the grand adjusted total.

†Tonnes for 1920 to 1932 inclusive include New York State Barge canal and Illinois waterway traffic entering or departing from Great Lakes; for 1933 to 1938, inclusive, exclude New York Barge canal tonnage, and in 1939 exclude both New York Barge canal and Illinois waterway traffic.

‡Shown in column "Internal and local."

§New York State Barge canal coastwise and internal traffic combined, not separable.

||One-half of amount included in "Total ports."

lupe river, Texas; the improvement of the Trinity river and tributaries, Texas, for navigation, flood control and allied purposes; the construction of a lateral canal in the Mississippi river in the Chain of Rocks section near St. Louis, approximately 8 mi. long and 9 ft. deep; further improvement of the Illinois waterway, Illinois and Indiana Harbor canal and harbour, Indiana; the Missouri river between Sioux City, Ia., and the mouth; the construction of a new hydroelectric power plant at St. Marys river, Michigan; the construction of dams and open channel improvement for the purpose of providing slack water navigation on the Snake river, Oregon, Washington and Idaho; and the construction of the McNary (Umatilla) dam for purposes of navigation, power development and irrigation in the Columbia river, Oregon and Washington.

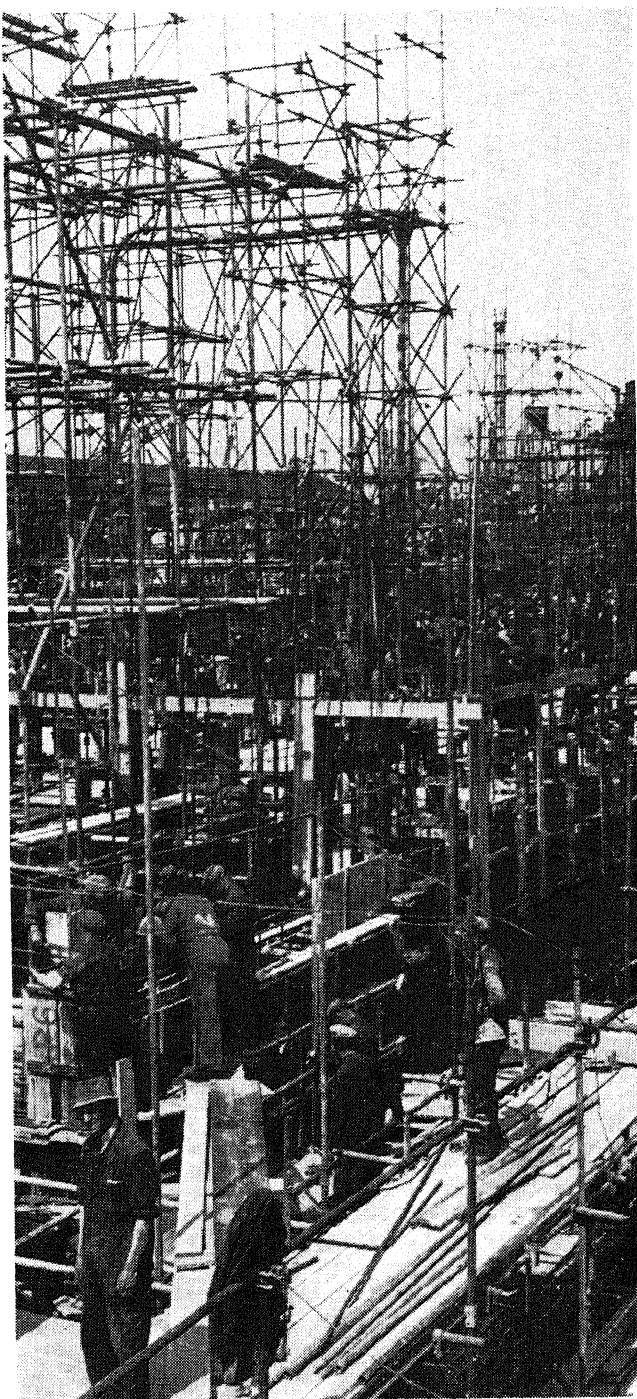
(R. A. WR.)

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Great Britain.—In the years just before World War II, ocean shipping was steadily recovering from the effects of the great damage done to it during 1914–18. While the British tonnage was not up to the older totals the average size of ships had increased and some very large ships (such as the "Queen Mary") had been built and large docks were constructed to serve them. By reason of the movement in many countries toward autarchy, foreign trade had not grown to the extent that had been hoped, but it was very considerable. International competition was keen, and the development of harbours to receive large ships and speed up their "turn-around" was pushed as rapidly as conditions permitted.

The outbreak of World War II and especially the events of 1940 transformed the situation, compelling the extemporization of additional shipping facilities in many of the ports which previously had been confined to coastal trade, throwing enormous burdens on others and greatly reducing the activities of those which were in the danger zone. Especially after the fall of France, many of the ports which had been purely commercial developed strong naval features, and all were controlled by the admiralty and the ministry of war transport. London, Southampton and Hull diminished greatly in importance while Liverpool, Avonmouth, Belfast and the Clyde ports became paramount. The larger passenger ships became troopers or merchant cruisers and the transport of cargo took complete precedence over passenger traffic, which practically disappeared except for war purposes. The heavy toll of shipping taken by submarines and mines reduced the volume of merchant shipping until the latter years of World War II but vastly stimulated the repair and new construction work of the shipyards and the demand for dry docking and slipways.

There was considerable damage to several of the harbours, especially London, Hull, Southampton and Liverpool. These changes not only affected the United Kingdom harbours directly, but by causing many activities to be shifted to the dominions and colonies (and later to the U.S.) stimulated the latter to a high degree, so that the end of the war found the United Kingdom with much reduced shipping, very small coal exports, heavily damaged port facilities, much obsolete plant and increased competition with overseas ports. The loss, however, was partly offset by additional wharfage and wharf equipment, and even by



Section of a prefabricated harbour under construction at Southampton, England, early in 1944. The harbour was later transported for use in Normandy, France

new ports specially constructed to deal with military cargoes and the oil jetties and pipe lines which enabled petroleum products to be loaded at convenient points whence they could be pumped across country.

The climax of British home port operation during World War II was the operations of D-day in June 1944. The prefabricated ports ("mulberries") were prepared in British harbours, assembled and dispatched from British harbours; one-half was assembled, controlled and operated in Normandy by men whose experience had been gained in British harbours. The most novel feature of these harbours, which might well take a place in commercial harbour practice, was the spud pier pontoon. The spud pier

consisted of one or more pontoons, each of which rested on the sea bed through four massive steel "spuds" (four sq.ft.) which could be raised or lowered by winches operated from diesel electric plant installed in the pontoon. This system, long used for certain types of dredger, enabled the pontoon to be firmly anchored and adjusted as to height so that it had the portability of an ordinary floating pontoon and the rigidity of a fixed pier but without the variable "freeboard" of the latter. In the "mulberry" set-up there was about 18 ft. of water alongside at low tide, and as the tide might rise as much as 23 ft. there was about 41 ft. at very high water. The pontoons were connected to one another and to the shore by flexible bridges. The "phoenixes" or concrete caissons which were floated into place and sunk to form breakwaters were only novelties from a harbour engineering point of view in respect to the speed and magnitude of their use. Many of the British harbours were provided with special loading "hards" for the accommodation of beach landing craft, and it was possible that some of these might have a future commercial application.

After the end of World War II, shortage of labour and the uncertainties arising from the government's nationalization policy prevented much from being done to restore and improve home ports or to realize the programs drawn up by the various port authorities, but a vigorous start was made.

British Commonwealth.—The harbours of the British dominions and colonies (over 200 in number) were greatly stimulated by World War II. Major dry docks were built in South Africa (Capetown) and Australia (Sydney), which enabled the largest ships afloat to be repaired in those countries, and in all the lands of the commonwealth, the harbours increased their equipment of docks (dry or floating), slipways, wharfage, craneage, warehousing facilities, berthage, rail connections and organization. Furthermore Canada, South Africa, Australia and New Zealand all developed their industries to a degree which rendered them to a considerable extent independent of United Kingdom resources.

While the harbours of Hong Kong, Singapore and Rangoon suffered to some extent from war damage, neglect and Japanese occupation, they were all rapidly recovering their physical conditions. Their political futures were somewhat obscure, and it might be reasonably supposed that no large developments would take place there for some years, but as they were all fairly well equipped in 1939, the repair of war damage put them back to adequate capacity. In India and Ceylon all the harbours were very active during World War II, and there was a certain amount of development. Thus the port of Vizagapatam was able to advance part of its prewar scheme for expansion, Colombo acquired a new graving dock and certain other useful additions, and slipways and repair facilities generally, which were always inadequate in Indian ports, expanded appreciably. Bombay, tremendously overloaded with shipping during the war, suffered seriously in April 1944 from the explosion of a munition ship, but made a good recovery. Aden had enormous additions made to its mooring areas, and breakwaters were built which gave still better shelter. Improvements and additions were made in Mombasa, Durban, East London, Freetown and Takoradi and to all the major ports of Canada. In Canada, extensive construction of new ships and repair of damaged ones was undertaken, and the facilities created for this work were to remain actually or potentially for peacetime use.

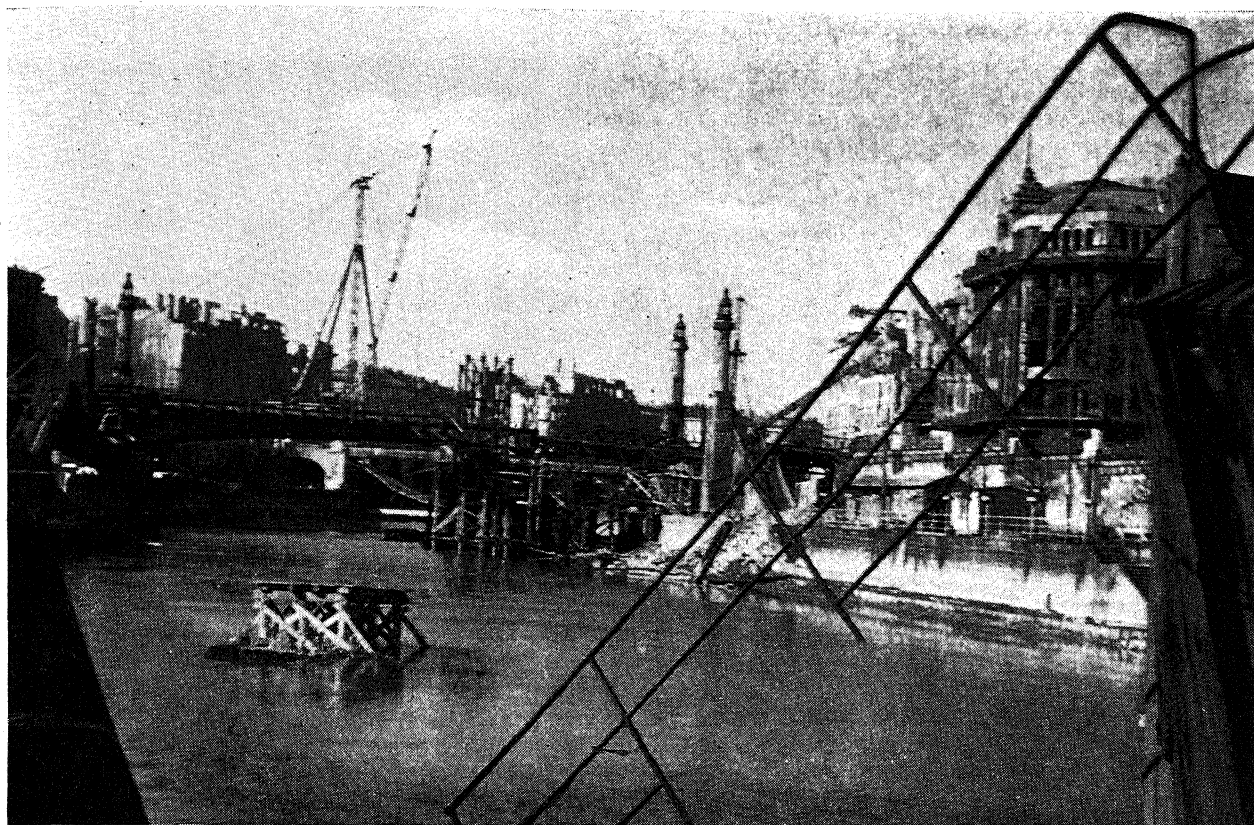
The major graving docks built during the war period in Capetown and Sydney were of special importance. The first was typical of the requirement which was now considered necessary in a first-class harbour. It had an effective length of 1,212 ft., a width at 34 ft. below low water of 136 ft. and a depth over the sill at high water of 45 ft. 9 in. It could be divided by an intermediate caisson into two basins, and there were alternative positions for this caisson. It led off a new wet basin 6,000 ft. by 2,000 ft. with 40 ft. depth at low water and berthage for 14 large ships, and had 2 double-storey sheds 500 ft. by 120 ft. with 3-ton roof cranes and 5-ton lifts. In several commonwealth ports there were opportunities for the authorities to acquire floating docks which had been constructed for naval purposes.

Europe.—The harbours of continental Europe presented a sad picture in 1946. With the exception of ports in Spain, Portugal and Sweden, most of them (there were something like 300 open to foreign trade) suffered some damage and many received grave injury. In addition, owing to political complications, many were working on only a very limited scale. The vast nexus of rail, canal and air communications had been disrupted by war damage, or military barriers. Repairs were mostly of an improvised character, operation was still under military control throughout large regions, ship repairs and facilities were scarce, iron and fuel supplies were scanty, and the whole shipping situation was dominated by the problems of distributing the indispensable minima of food and other essentials of life.

It seemed useless in 1946 to discuss the future of the German ports, but their rehabilitation was proceeding and the inland waterway system to which they are related was slowly recovering. The suicidal policy adopted by the Germans before surrender, of destroying bridges and canals, had proved a grave hindrance, but the great improvising skill developed by military engineers had prevented a complete collapse of communications. Information as to the actual conditions of the ports in eastern Europe was lacking, but sufficient was known to indicate that conditions there were much the same as in Germany.

In western Europe recovery was more marked, and many of the harbours were functioning as well as could be expected in the circumstances. Warehousing accommodation was particularly short, and the housing of port workers was still a serious matter. The great ports of Belgium and the Netherlands were returning steadily to normal. The great lock at IJmuiden was being repaired, but there was still much to be done to clear obstructions. Copenhagen was practically undamaged. The Rhine had been opened again to through navigation.

Probably the greatest hindrance to port recovery in Europe was the political barrier. A great harbour is dependent for its very existence on good communication with a large hinterland and linkage to an extensive system of overseas harbours, or in the case of an *entrepôt*, free connection with a double set of overseas harbours between which it is the linkage point. Unless physical and commercial connection between the harbour and its sources and delivery points is free, or at least consistently and satisfactorily regulated, the prosperity of the harbour can not occur. The disputes concerning the political future of Trieste illustrated this point. Internationalization of contested ports might be a *pis aller*, and undoubtedly lead eventually to other problems (as had been the case for example with Egyptian and Chinese harbours) but it did appear to be the only solution of a practical character where conflicting national aspirations were irreconcilable.



Sunken bridges, damaged locks and stalled vessels made a bottleneck of the Danube canal near Vienna after the battle for the Austrian capital in 1945

France suffered particularly from damage to her harbours during World War II. Practically every port was affected, Marseilles coming off the best. Brest, Le Havre, Bordeaux, Rouen and Dunkirk were all heavily injured and by 1946 had made only slight recoveries. Not only were the port installations destroyed, the approaches blocked with wrecks and mines, and equipment ruined, but all the rail and road system was injured for many miles around.

Following the Allied invasion in 1944, military resources enabled some ports, such as Calais and Cherbourg, to be brought partially back to use, but in 1946 there were still grave shortages of wharfage, storage accommodation, housing and other facilities.

Italian ports were heavily bombed, Genoa, Leghorn and Naples suffering most. In Greece, shipping was handicapped by the blockage of the Corinth canal.

The strategic importance of harbours was emphasized once again by the events of World War II. The invasion of the continent was practically impossible until the artificial harbour scheme had been devised, while the last struggles in the west revolved about Antwerp as a supply point for the armies of the Allies.

Certain other lessons sprang from World War II. It was found possible to make temporary repairs to wharves, docks and other harbour features far more rapidly than had been anticipated, and the flexibility of motor transport by road, or if necessary by tracked vehicles made it possible to keep a port in operation in conditions which would have seemed quite impossible some years earlier. These were not very consoling features in the face of the great damage of modern war, but they at least showed that technical development had a positive as well as a destructive side. It had also become apparent that there

was a need for a more intimate interest to be taken in the housing and welfare of harbour employees, not only for humanitarian reasons but also for the very efficiency of the harbour operations. The damage done to the residential areas occupied by dock workers in London and Hamburg proved nearly as injurious to the working of those harbours as the direct destruction of facilities in the harbours themselves.

Technical Aspects.—No very remarkable features of harbour technique appeared in 1937-39, but the war did bring forth a number of inventions, some of which would perhaps affect future practice. The most significant of these were radar and asdic, which respectively enabled ships to find one another in fog and to discover underwater features. Radar could of course also be used for traffic control, and considerable attention was being given in 1946 to its peacetime applications. Echo-sounding (of which asdic was an extension) was now very extensively used for harbour surveys as well as for deep-sea work. Amphibious craft proved so useful in the war that it was thought they might come into rather wide use for the discharge of small vessels in minor harbours. Pontoons, floating docks and other harbour craft were made during the war of steel units bolted together, but it was not considered probable that these would be adopted as permanent features in harbour practice. The flexible landing bridges which connected the spud piers to the shores in the "mulberry" harbours were also not thought likely to be applied to commercial harbours.

Wharf design had been very thoroughly studied in the years between World Wars I and II. The slab and pile construction increased in popularity for poor foundation conditions and high wharves. A "bell" type of fender for dolphins was found to be very successful in protecting ships and dolphins from mutual damage. Dredging technique showed few changes. The use of large seagoing

suction-hopper dredgers increased, but the number of new vessels built between 1937 and 1946 was quite small, and little had yet been done in Europe or the dominions to adopt the Franco-U.S. type of suction dredger with side flexible pipes.

Some of these vessels, however, were seen working in European waters, and it was probable that their advantages would lead to their adoption.

An interesting feature was the growing practice of using tidal models of harbours before embarking upon new designs. Not only in respect of the stilling of waves and the control of currents could such models give valuable forecasts, but also in regard of accretion or scour. The technique of such models was elaborate, and practical experience was necessary to the proper interpretation of their results.

Scientific investigation of waves, beach formation and erosion and tidal currents made considerable progress during 1937-46, especially during World War II. Devices such as floating breakwaters, etc., received an unusual amount of attention and there could be little doubt that the technical information which had become available to harbour engineers would show later in novel and valuable features. (See also AQUEDUCTS; CANALS AND INLAND WATERWAYS; DAMS; FLOOD CONTROL; TENNESSEE VALLEY AUTHORITY.)

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Roads and Highways

At the beginning of the decade 1937-46, the outlook for highway improvement throughout the world was promising. The dependability of automobiles, trucks and busses, as instruments of transportation had been demonstrated for many years, but, in most countries, the full service to be obtained from these vehicles when complemented by an adequate system of highways was just being realized to an extent that stimulated action. Less developed countries were accelerating the initial construction of highway systems, and those with old systems were considering or beginning the modernization of obsolete roads to make them suitable for safe and rapid movement of large volumes of traffic.

In 1937, 1938 and 1939 there was every indication that the greatest highway construction program in history was developing throughout the world. Then came World War II, and normal highway construction ceased in the countries at war and was seriously checked elsewhere. A few notable highways such as the Alaska highway and the Burma road were built as war projects, but the most significant effects of the war on highway transportation was the halting of new construction and the great destruction of highway surfaces and highway bridges in combat areas. Roads and bridges destroyed in Italy, France and Holland would take years to replace.

The end of the war was followed by immediate and world-wide interest in highway improvement. Ambitious prewar plans were revived and enlarged. Depleted resources, political unrest and uncertainty and readjustments from war conditions prevented large construction programs, but planning was conducted on a scale that promised great activity in future years. The people of the world desired peace and prosperity, and it was realized that good highways would be necessary for industrial, agricultural and social development.

A considerable mileage of highways was constructed in the 10-year period, but disruption of normal reporting

services during the war prevented any estimate of the amount. The most important progress made was in the adoption of new concepts as to the character of highway improvements needed and in action by many different groups in almost every country to stimulate highway development.

Technical Progress.—Good progress was made in improving methods of highway construction, but it consisted of improving ways of using known materials rather than discovery of new products.

Marked advances were made in preparing mixtures for both concrete and bituminous road surfaces. In some parts of the world there are aggregates that, when used in concrete, cause disintegration. Other aggregates do not retain a coating of tar or asphalt and also cause disintegration. Laboratory research developed methods of identifying such aggregates and the procedure to be followed to avoid road failures. New materials were developed for addition to cement or to concrete mixtures that materially increase the durability of concrete.

For many years highway engineers sought to avoid road failures resulting from placing surfaces on clay and other unfavourable soils. They also sought to combine local materials such as sand and gravel with a binder such as clay or bituminous materials to make a low-cost road surface. They studied soils to devise ways of compacting fills to avoid the cracking and breaking of road surfaces resulting from settlement extending over a period of years. A science of soils for application in highway work was developed. Practical application of soil science increased greatly after 1937. Soils laboratories were established, and construction engineers applied the knowledge gained in research laboratories.

During the war this knowledge was of great importance in building military airfields and roads in all parts of the world.

Demonstration of the practical results of highway research gave impetus to this work. In the United States, research by state and federal agencies was directed to war purposes until near the end of 1945 and was then reoriented to solve the problems of a large peacetime program. In England, the local authorities and engineers responsible for highways became increasingly research-minded, largely through the leadership given by the road-research laboratory of Britain's department of scientific and industrial research at Harmondsworth near London. Brazil established laboratories at Rio de Janeiro, and Argentina continued work on its special road problems.

At the beginning of the war, the research establishments of Germany and France were among the important contributors to highway knowledge. The organization in Germany was destroyed, and the work in France received a serious setback.

Development of the diesel engine produced important results in highway transportation. This engine had been invented years before, but marked improvements in efficiency and reliability resulted in a widening of the field of use during the decade 1937-46. Diesel-powered bulldozers, graders, shovels and trucks made possible the moving of the great quantities of earth necessary in modern highway construction. With less efficient machines it would have been necessary to make some sacrifice in standards for width, grades and directness of highways. The num-

Four-lane Pennsylvania turnpike, built at a cost of \$70,000,000 and opened to traffic Oct. 1, 1940. The maximum grade of this 160-mi. superhighway through the Appalachians is 3%; there are no crossings, and cars can take all curves at 90 m.p.h.





A six-lane express highway, opened June 30, 1939, forms the New Jersey entrance to the Lincoln tunnel, which extends under the Hudson river to New York city

ber of trucks and busses driven by diesel engines increased greatly.

The bulldozer and other equipment developed for highway purposes were important tools in winning the war. They were used by U.S. forces to build landing fields for aeroplanes in a few days where Japanese methods would have required months.

Express Highways.—In 1937 the German system of *autobahnen* and the Italian *autostrade* were the best known examples of modern highways built for rapid and unobstructed travel of automobiles. The United States had preceded Germany in developing four-lane divided highways for free movement of large numbers of vehicles, but the highways constructed were short in length. In 1937 the Pennsylvania turnpike, a 160-mi. highway linking Harrisburg and Pittsburgh in the eastern part of the United States, was authorized; it was completed in 1940. By 1944, the United States had over 6,000 mi. of primary state highways with four or more traffic lanes, but many of these were not divided to separate opposing streams of traffic, and in many instances frequent intersections with other highways at grade prevented the highways from having true express characteristics.

There were more than 1,000 mi. of highway to which access was permitted only at selected points some distance apart.

Experience in England and the United States demonstrated the necessity of controlling access to routes built for express traffic movement. Wide highways were built leading out of cities to accommodate fast-moving traffic, but businesses and dwellings were placed fronting on these highways which were soon converted to local business streets.

It was found that this could be prevented only by placing the highway on a wide right-of-way, permitting access only at selected points and constructing parallel roadways to serve local traffic movement.

Notable multiple-lane highways were built in a number of countries. Canada completed a divided highway from Niagara Falls to Toronto. In 1940, Brazil began the construction of a 35-mi. divided highway beginning at the port of Santos and climbing an escarpment to São Paulo. Broad, modern highways were constructed at Buenos Aires, Argentina, and Rio de Janeiro, Brazil. England actively planned a 1,000-mi. system of motorways, but the war

prevented the beginning of construction. At the beginning of World War II in 1939, France was constructing a 19-mi. divided highway with controlled access from Paris toward Normandy and Brittany. Work stopped during the war, but the highway was completed soon after the war ended.

During the 10-year period, highway design grew up and matured. As exemplified by the best highways in several countries, modern motorway design involved a number of features, varying combinations of which were found in the better roads constructed to carry a large traffic volume.

The more significant features were: exclusive right-of-way with prescribed points of entry and exit, the number varying with the environment and type of facility; separation of opposing traffic by an unpaved dividing strip; separation of fast from slow traffic by means of separate lanes for each; easy curvature; low gradients; adequate pavement capacity; land service roads where necessary; elimination of all railroad, street or highway crossings at grade; hard surface pavements; adequate landscaping; and provision for incorporation into the roadway design of abutting service facilities, such as gasoline stations and parking areas.

The United States designated and began construction of a 40,000-mi. national system of interstate highways. Much of this system was to be improved as four-lane, divided highways without intersections at grade with other transport arteries. The work was undertaken as a postwar project.

Bridge Construction.—Considerable progress was made in replacing old and obsolete bridges with structures of sufficient width and strength to accommodate modern traffic. Many new bridges were required to separate grades at intersections with other highways and rail lines. Welding came into more general use, as did the types of bridges known as rigid frame and continuous span. (*See also BRIDGES.*)

New Highways Through Undeveloped Regions.—Construction of roads of great length through remote wilderness areas far exceeded that of any other ten-year period in history. In the spring of 1942 the United States, after agreement with Canada, undertook the construction of a road from the railhead at Dawson Creek, British Columbia, to a junction with the Richardson highway at Big Delta, 100 mi. from Fairbanks, Alaska. This highway, through 1,420 mi. of wilderness in a subarctic region, through mountains and across muskeg swamps, permanent-

ly frozen ground and many large streams, was built for the defense of Alaska and to develop an air route to the U.S.S.R. During 1942 army engineer troops and civilian forces directed by the Public Roads administration forced through a pioneer road. Army forces were withdrawn from highway construction early in 1943. During the following months 15,000 civilian workmen completed a highway suitable for use as an army trucking route. Completion was in Oct. 1943.

Following occupation of the seacoast of China by Japanese, intensive efforts were made in 1938 and 1939 to build supply routes from interior China to the outside world. Highways were built to French Indo-China and the Soviet Union. The most notable effort was construction of the 610-mi. road from Chungking through a mountainous region infested with malaria-carrying mosquitoes to Lashio in Burma. This highway, called the Burma road, attracted world-wide attention in 1940, when it became a Chinese life line.

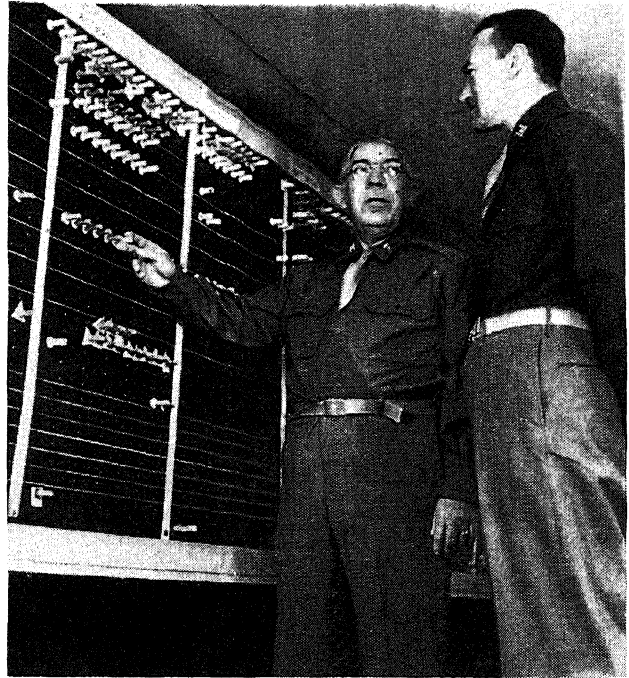
In 1940 work was begun on a 621-mi. highway across the so-called "dead heart" of Australia in order to move military supplies to the important base at Darwin on the north coast of Australia. The highway was opened to traffic in 1941.

In 1945 a 478-mi. road from Ledo in northeast India to a junction with the Burma road near the Chinese border was completed as a military project.

This road through mountains and tropical jungles was built with great difficulty to reopen a wartime supply route to China.

Many improvements were made on the Pan-American highway extending from the southern border of the United States through Central America, down the west coast of South America and across to Buenos Aires and Rio de Janeiro. The section of this route north of Panama was also known as the Inter-American highway. Important construction was done in Mexico, all of the Central American countries and in Ecuador and Peru. By 1946 tourist travel from the United States to southern Mexico was pos-

Heavily wooded areas being cleared for the Alaska highway in 1942



All traffic on the Alaska highway was recorded on this control board at the headquarters of the U.S. Army Northwest Service in Dawson Creek, B.C. Supply convoys to U.S. northern outposts rolled steadily over the highway during World War II

sible. Much of the route beyond had been improved and was being used by local traffic, and in several places for travel between countries, but impassable jungles or mountainous areas not penetrated by roads prevented tourist travel. Of the 3,279 mi. from the United States to Panamá City, 2,566 mi. could be travelled in all weather, 303 mi. could be travelled in dry weather only, and there were 410 mi. of impassable gaps. Between the Canal Zone in Panamá and the Panamá-Colombia boundary there was an impassable gap of about 300 mi. Of the 8,097 mi. in South America (alternate routes included) 6,162 mi. were surfaced, 1,646 were passable in dry weather, and impassable gaps amounted to 289 mi.

War Damage.—Destruction of highways, particularly bridges, reached a peak in 1945. In 1944 and until May 1945, as the Germans were driven from large areas in the U.S.S.R., Italy, France, Belgium and Holland, they destroyed practically all bridges behind them. Every bridge and culvert between Rome and Naples, about 1,200 in all, was blown up. About 6,500 bridges in France were destroyed. Numerous magnificent bridges across the Rhine were wrecked. In Holland, 30 large bridges and over 1,000 small ones were destroyed. Nowhere did the destruction exceed that of the many bridges on the system of *autobahnen* in Germany.

In the Philippine Islands, war damage and neglect of highways caused a loss amounting to 35% of the prewar value of the highway system. Of 1,741 permanent-type bridges, 621 were destroyed. In 1945, the U.S. Army provided temporary structures crossing more than 200 streams, and in 1946 the United States allocated nearly \$10,000,000 and provided engineers to assist the Philippine government in rehabilitating its highways. Intensive replacement of the destroyed structures was under way in 1946 in all war-damaged countries.

U.S. Highway Construction.—In the period from Jan. 1, 1937, through 1945, 222,000 mi. of surfaced highway were constructed in the U.S., of which nearly 70% consisted of



Aerial view of the Stilwell road, built to link India and China at a cost of \$148,910,000. It was declared surplus property by the U.S. army on Nov. 6, 1945

primary state highways. Most of this work was improvement of existing highways and only about 5% was on new location.

Motor vehicle registration increased from 30,041,000 in 1937 to a peak of 34,854,000 in 1941 and was estimated to be 32,511,000 in 1946. In each year of the 10-year period, highway users contributed in the form of gasoline taxes, registration fees and other special taxes more than \$1,000,000,000 for highway purposes. In 1941 the contribution was \$1,452,000,000.

Expenditures for highway construction, maintenance and debt were more than \$1,000,000,000 each year, amounting to \$1,538,000,000 in 1941.

(See also MOTOR TRANSPORTATION.) (T. H. MACD.)

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Robots

See ROCKETS.

Rockefeller Foundation

See SOCIETIES AND ASSOCIATIONS.

Rockets

It is necessary to distinguish between rockets as complete projectiles, comprising fuze, war head, rocket body and fins and rocket propulsion units, which constitute a source of power used in many different applications, among which projectiles represent one class. It is customary to refer to the propulsion unit as the rocket motor. Its basic characteristics remain the same, whatever its purpose, but constructional details are varied to suit specific requirements. The outstanding common characteristic of rocket motors, whether for projectiles or power units, is the development of thrust for a limited time, and in every practical application of rocket technique minimum weight is a paramount consideration. Depending on the purpose for which the motor is required, greater or less complexity may be incurred, and when intended for repetitive use as in assisted take-off or propulsion of aircraft it must be durable, and the thrust must be precisely controlled to avoid overstressing of aircraft structures. In aircraft propulsion, controlled flexibility of thrust during operation is required,

but in projectile applications where consistent ranging is important, the total impulse delivered (thrust \times time integral) is more important than the precise value of thrust or duration taken separately. In projectile applications where maximum range is required, ballistic shape is important, and a long, thin rocket is usually implied. Where extreme accuracy of flight is sought, control should be invoked; but if this is impracticable, great attention must be given to accuracy and rigidity of construction at certain essential points in the rocket.

Uses and Characteristics.—The following list includes examples typifying the salient characteristics of rockets:

(1) Rocket propulsion of aircraft. The first example was the German Me. 163, using hydrogen peroxide (80%) as oxidant, and a mixture of methyl alcohol and hydrazine hydrate as fuel. Hydrazine hydrate induces spontaneous inflammability of the fuel. The rocket motor was developed by Dr. H. Walter at Kiel about 1942-43. Best models incorporate main and pilot combustion chambers for climb and cruising respectively. Combustion chambers are liquid-cooled by fuel to counter high combustion temperature.

(2) Assisted take-off of aircraft. Many different types were designed and used during World War II in the U.S.A., Britain and Germany, employing solid and liquid fuels of several natures with duration from 4 sec. to 60 sec. and thrust from 1,000 to 6,000 lb. These were of particular use for heavily laden aircraft or where take-off distance was restricted, as in small airfields or aircraft carriers.

(3) Auxiliary motors in aircraft. An obvious application, contemplated by many designers, was to provide exceedingly rapid climb or speed-boost for limited period.

(4) Line throwing for lifesaving, climbing, river crossing and the like; projection of nets, grapnels and ladders; erection of wire barrages to counter low-flying aircraft. In cases where the line is light in weight or the object to be thrown is massive, a short rocket-burning time is permissible providing snatch on the line is avoided. In this case the momentum of the rocket or, e.g., the grapnel is sufficient to unspool the main run of line. Longer burning time is necessary for nets or similar objects where the main weight is distributed over the thrown length.

(5) Large long-range projectiles. The first example was the German V-2, used in World War II. The payload was 1 ton (normally a war head filled with high explosive). Design range was 190 mi. It was propelled by bifuel unit employing ethyl alcohol and liquid oxygen. Total weight unfuelled was 4 tons; fuelled, 12 tons. Fuels were delivered by 2 centrifugal single stage pumps driven by 550 h.p. impulse turbine employing steam generated at 20-30 atmospheres by catalytic decomposition of hydrogen peroxide. Stabilization was accomplished by four large fins at the tail, and the trajectory was controlled by four graphite rudders in the jet stream together with four control vanes at the extremities of the fins. Movement of the internal rudders and the vanes was by electrically driven servo-motors, monitored by gyroscopes. Velocity was controlled by a fuel cutoff, operated by integrating an accelerometer or ground

radio signal.

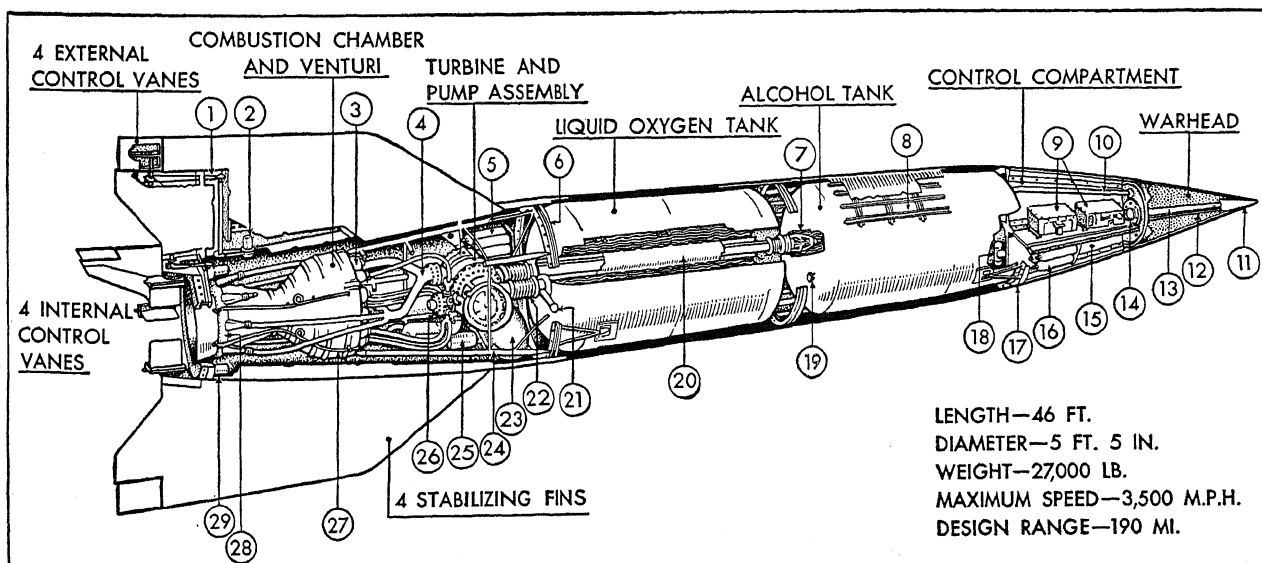
(6) Recoilless armament for aircraft. This application was used by all four major belligerents in World War II. Complete absence of recoil (when fired from an open-ended projector) permitted the use of large calibre rockets without stressing aircraft structure. Special problems were encountered with unguided rockets in connection with sighting, owing to curvature of the early part of rocket trajectory and sensitiveness of the rocket to direction of launch relative to instantaneous flight path of aircraft. Larger types were fitted with wings and guided to the target by radio link or wire link from the parent aircraft. A special case was the rocket-assisted bomb, where rocket motors were employed to obtain high striking velocity (hence deep penetration) when bombing from relatively low heights for greater accuracy.

(7) Massed fire on land or sea. Absence of recoil permits multi-barrel rocket mountings on light, easily transportable carriages, or large multiple banks of projectors in ships.

Solid and Liquid Fuel Motors.—There is an obvious classification of rocket fuels into solid and liquid types, and it is instructive to study the characteristics of these two natures of propellant on a comparative basis. The fundamental difference between them rests in the fact that the solid propellant has geometrical shape and, since burning takes place on its surface, the rate of burning of a solid charge is dependent on its shape. Other factors are influential, particularly chemical composition, combustion pressure and the initial temperature of the charge, but these factors are also important with liquids.

It is generally a requirement that the thrust delivered by a rocket motor should be substantially constant or, alternatively, that it should be amenable to controlled variation. Except in cases where the requisite variations

Official British version of the V-2 stratosphere bomb. (1) chain drive to external control vanes; (2) electric servo-motor; (3) burner cups; (4) alcohol supply from pump; (5) air bottles; (6) rear joint ring and strong point for transport; (7) servo-operated alcohol outlet valve; (8) rocket shell construction; (9) guiding equipment; (10) pipe from alcohol tank to warhead; (11) nose fitted with switch for operating warhead fuse; (12) conduit carrying wires to nose of warhead; (13) central exploder tube; (14) electric fuse for warhead; (15) plywood frame; (16) nitrogen bottles; (17) front joint ring and strong point for transport; (18) pitch and azimuth gyros; (19) alcohol filling point; (20) double-walled alcohol delivery pipe to pump; (21) oxygen filling point; (22) concertina connections; (23) hydrogen peroxide tank; (24) tubular frame for holding turbine and pump assembly; (25) permanganate tank; (26) oxygen distribution from pump; (27) alcohol pipes for subsidiary cooling; (28) alcohol inlet to double wall; (29) electro-hydraulic servo motors



are to be repetitive from one unit to another, solid fuel rockets are not amenable to substantial thrust variation, since the rate of burning at any stage is predetermined by the original geometric shape of the charge. Thus, the most frequent use of solid fuels is in applications where approximately constant thrust and, therefore, constant burning surface is desirable. The number of geometric shapes capable of meeting this requirement is limited. In cases where no attempt is made to restrict burning at any point on the surface, a simple tubular shape is suitable, and constancy is secured by the fact that the outer surface decreases as the inner surface increases. An alternative, where it is necessary to prevent burning on the outer surface of the charge, is to employ a star-shaped inner section. Then, as burning proceeds, the star section progressively deteriorates into a circle, and by proper design an approximately constant surface is retained.

These two methods are typical for rocket motors in which a relatively large burning surface is required. It is, of course, possible to use multiple charges comprising, for example, a bundle of tubes or a tube inside a star section. A third method is available for cases where a relatively small burning surface is required, which might be to suit a high rate of burning, or to obtain a long period of burning. This method consists in using a solid charge, protected on its outer surface to prevent burning there, and burning only from the end surface, cigar-wise.

A serious restriction with solid charges is now apparent. The characteristics of a rocket motor are broadly defined by (1) thrust; (2) duration; (3) length to diameter ratio and (4) weight. The possibility of meeting any specified thrust and time requirements depends on the characteristic rate of burning of the proposed fuel, and on the burning sur-

face and "web" thickness which can be made available together. Basically there are only two arrangements of the charge, one where the direction of burning is perpendicular to the charge axis, on a surface approximately equal to its outer surface area; the other where burning is parallel to the axis on a surface approximately equal to the cross-sectional area. There is no simple means of achieving a gradual transition between these two systems.

No such restriction exists with the liquid-fuel system since, without variation in the intrinsic rate of burning of a fuel, any desired rate of consumption can be arranged by suitable design of feed rates and combustion chamber. This is the fundamental difference between solid and liquid fuel systems. There are, in addition, many ancillary differences.

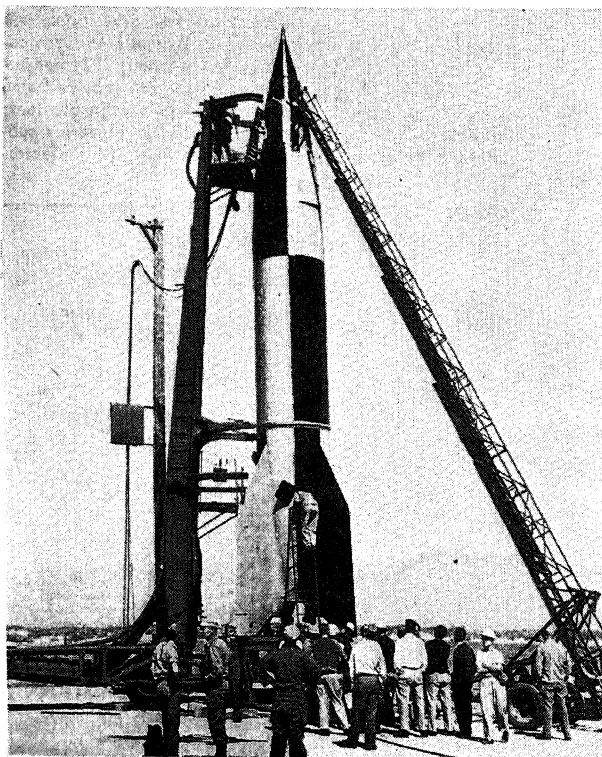
Stabilization and Weight.—An unguided rocket projectile consists of the rocket motor, the payload, and the fins (if they are employed). Alternatively, the rocket may be spin-stabilized like a normal artillery shell, and in this case fins are unnecessary. The choice between fins and spin for stabilization depends on the characteristics sought in the projectile. Generally speaking, fin stabilization is desirable in high performance rockets, but the fins are usually a nuisance in handling and packing, and a spin-stabilized rocket is preferable from the point of view of convenience. It is, however, impracticable to provide the excessively high rates of spin which would be necessary to stabilize a long, thin projectile; and in all cases where spin is employed there is some sacrifice of forward velocity on account of jet energy employed to develop spin.

A guided or controlled rocket projectile must carry an appreciable weight of apparatus which competes against the useful payload in the total carried weight. On general grounds it is clear that this tends to make small guided projectiles uneconomic on weight considerations but, when occasion demands, control apparatus can be made surprisingly small and light in weight. It is probably true to say that, except for the very smallest rocket projectiles, the weight of control apparatus is not a prohibitive factor. For projectiles required in very large numbers, however, the cost of control apparatus may be a determining point. Moreover, since there are obvious difficulties in controlling several projectiles concurrently, it may be useless to consider such cases for control.

Rockets in World War II.—Widespread interest in rockets and jet propulsion had grown up in the early '30s. In 1933 the rocket experimental station in Berlin was already a well established concern, developing a rocket stabilized by one large gyro in the nose. In 1934 the gyro having now been shifted to the centre, the rocket was successfully launched on a flight of 2,000 m. By 1938 a projectile similar in shape to the V-2 and about 25 ft. long, with automatic steering and rudders in the gas stream, was launched vertically in the manner eventually adopted for V-2. This projectile had a range of some 11 mi.

In Great Britain the revival of official interest began in 1936, when Sir Alwyn Douglas Crow was appointed to take charge of rocket development. In early 1939 a large-scale ballistic trial of his 3.25-in. anti-aircraft rocket was carried out secretly in the British possession of Jamaica, chosen because clear skies were needed to permit observations of the rocket shell-bursts at high altitude. Several million rockets of this basic design were manufactured in Great Britain for use in World War II for anti-aircraft purposes and, in a slightly modified form, for firing from aircraft and for use on land as medium range artillery. This 3-in. U.P. (un-rotated projectile) was the first rocket weapon used by the Allies, but it was the forerunner of scores of

Inspection of a German V-2 rocket before it was launched at U.S. army ordnance proving grounds, White Sands, N.M. Fired on May 10, 1946, it rose almost 75 miles in the second of a series of tests under the long range guided missiles program which included investigation of the ionosphere





The Mark-102 rocket launcher, operated automatically and capable of firing forty 5-in. rockets per minute, being demonstrated at Dahlgren, Va., in May 1946

others developed by all the major belligerents. The advance, which it typified, lay in the use of extruded cordite for the propellant charge instead of gunpowder, which had been the most powerful solid rocket propellant available up to that time. It permitted the design of much larger and more powerful rockets with much greater velocity and range.

It is impossible to overlook the importance of the German V-2 as a landmark in rocket development. It was preceded, it is true, by the V-1, launched against London from the German-occupied French coast from June 13, 1944, in increasing numbers until the Germans had been driven from all convenient launching points. But the V-1 was not a rocket; it was an expendable pilotless aircraft, powered by a sub-sonic propulsive duct consuming petrol and atmospheric air. Its speed was in the range of 300-400 m.p.h. and it was, therefore, vulnerable to fighter aircraft and anti-aircraft shells. Its relatively small size (17 ft. wing span and 22 ft. fuselage), combined with its high flying speed, made it a difficult target, but toward the end of the period of its large-scale use by the Germans a very high percentage of the missiles launched were shot down before reaching their target.

Not so with the V-2; carrying the same weight war head of nearly 1 ton, to a range of 190 mi. in a time of flight of 5 minutes, nothing could be done to deflect or hinder it once it had been launched. Its firing site required little

preparation; essentially it needed no more than a 25 ft. square of hard level ground with road access. The rocket rose vertically and could be fired equally easily from the middle of a wood or from the open road. Within three hours of its first arrival on the site, the rocket could be fired and the site cleared, leaving no visible trace.

Disadvantages of the V-2 lay in its relative complexity and the large production effort needed to achieve the result. But it must be remembered that when it was used by the Germans the V-2 had hardly completed its development. It should be considered as only the forerunner of much more ambitious proposals, outstanding among which must be contemplated a piloted projectile fitted with retractible wings to be put out at the vertex of its trajectory, enabling it to glide hundreds of miles and land at its destination.

Postwar Developments.—A technical mission under the direction of Lieut. Gen. J. F. Evetts left England for Australia in April 1946 to explore the practicability of employing large tracts of waste land and desert there for rocket-firing trials. At White Sands, N.M., U.S. scientists fired V-2 rockets, assembled largely from parts recovered in Germany, to heights of over 100 mi., creating new altitude records. Recording and telemetering instruments, carried in the war head compartment, provided valuable new data concerning many meteorological problems. Other guided missiles, developed at the California Institute of Technology under the leadership of Dr. Frank J. Malina, were successfully fired and demonstrated the remarkable rate of technical progress in rockets achieved in the U.S.A.

A large experimental establishment was installed at Westcott aerodrome, near Aylesbury, England, for guided projectile research, under William R. Cook. (See also JET PROPULSION; MUNITIONS OF WAR.)

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Rodriguez, José Maria Caro

Cardinal Rodriguez (1866–), Chilean prelate, was born June 23, 1866, in Cahuil, Chile. Educated at the Santiago seminary and the Gregorian university, he was ordained at Rome in 1890. He was vicar apostolic of Iquique, the mining section of Chile, bishop of La Serena (1927) and archbishop of Santiago (1939). As ordinary of the Chilean capital, he maintained friendly relations with the government and furthered its social plans but kept aloof from political entanglements. He was host to churchmen from all the Americas who attended the Chilean National Eucharistic congress in 1941. Nominated to the Sacred College of Cardinals in Dec. 1945 he was created a cardinal at the consistory in Rome, Feb. 18, 1946. As illness prevented his attendance at the February rites, he received his red hat at a private consistory in the Vatican on May 17, 1946.

Roebling Medal

See MINERALOGY.

Roentgen Ray

See X-RAY.

Rokossovsky, Konstantin

Rokossovsky (1887–), Russian army officer, was a major in the tsarist armies that fought against the Germans during World War I. After the revolution, he joined the bolsheviks and saw action in the civil wars, 1918-20, and in the Russo-Polish campaign of 1920. During the peaceful interim between World Wars I and II, he was sent to the Frunze Military academy where he studied tank and air warfare. In World War II, he commanded one of the seven soviet armies defending Moscow in 1941. He also participated in the battle of Stalingrad, 1942-43, where he was in command of the 6 soviet armies of the Don front that trapped and annihilated the 22 divisions of the German 6th army.

During the soviet offensives in 1943 and 1944, Rokossovsky headed an army on the central front and played an important role in ousting the German forces from White Russia and eastern Poland. He led the 2nd White Russian army that broke through German defenses south of Lomza and subsequently destroyed German resistance in Stettin, West Pomerania and Mecklenburg provinces.

Roman Catholic Church

The pope is recognized as supreme ruler and pastor of the Roman Catholic Church. It is he who creates cardinals, and appoints archbishops, bishops, vicars and prefects apostolic who exercise ecclesiastical jurisdiction throughout the world.

The reigning pontiff at the beginning of the decade

1937-46 was Pius XI (*q.v.*), 260th successor to the see of St. Peter.

After Pius XI's death on Feb. 10, 1939, at the age of 82, Eugenio Cardinal Pacelli, secretary of state, was proclaimed pope; he took the name of Pius XII (*q.v.*) and was solemnly crowned on March 12.

Charged with the duty of assisting the pope in the administration of ecclesiastical affairs is the college of cardinals, titular pastors of churches in Rome. Under a discipline prevailing for centuries it is this body which, on the death of a pontiff, designates his successor in the see of Rome and as head of the Catholic church. With its full complement the college of cardinals consists of 70 members—6 cardinal bishops, 50 cardinal priests, who are bishops, and 14 cardinal deacons.

Pope Pius XI, at the secret consistory of Dec. 13, 1937, brought the Sacred college up to one less than the traditional number of 70. On that date he created five cardinals: Archbishop Arthur Hinsley of Westminster, England; Archbishop Pierre Gerlier of Lyons, France; Giuseppe Pizzardo, secretary of extraordinary affairs; Ermengildo Pellegrinetti, apostolic nuncio to Yugoslavia; Adeo-dato Giovanni Piazza, patriarch of Venice, Italy. With these additions, the composition of the Sacred college was 39 Italian and 30 non-Italian members. The 1937 consistory was the last in which cardinals were created until the history-making one in Feb. 1946.

In the interim the Sacred college had dwindled to 38 members.

On Dec. 23, 1945, Pius XII announced the names of 32 prelates to be raised to the cardinalial dignity. The consistory was scheduled for Feb. 18, 1946. At this consistory 28 of the 32 cardinals-designate received the red hat; reasons of health prevented the others from attending. In making the announcement the pope stressed the universal and supranational character of the church. His choice of those to be honoured bespoke this internationalism. Of the 32 new cardinals 4 were Italians and 28 from other countries. For the first time since the time of the Schism of the West, the Italian cardinals were in a minority.

All continents were now represented in the Sacred college.

The prelates designated to be cardinals by Pius XII on Dec. 23, 1945, were: Gregory Peter XV (Agagianian), patriarch of Cilicia of the Armenians; John Joseph Glennon, archbishop of St. Louis, U.S.; Benedetto Aloisi Masella, apostolic nuncio to Brazil; Clemente Micara, apostolic nuncio to Belgium and internuncio to Luxembourg; Adam Stephen Sapieha, archbishop of Cracow, Poland; Edward Mooney, archbishop of Detroit, U.S.; Jules Gerand Saliège, archbishop of Toulouse, France; James Charles McGuigan, archbishop of Toronto, Canada; Samuel Alphonsus Stritch, archbishop of Chicago, U.S.; Agustin Parrado y Garcia, archbishop of Granada, Spain; Emile Roques, archbishop of Rennes, France; Jan de Jong, archbishop of Utrecht, Netherlands; Carlo Carmelo de Vasconcelos Mota, archbishop of São Paulo, Brazil; Petit de Julleville, archbishop of Rouen, France; Norman Gilroy, archbishop of Sydney, Australia; Francis Joseph Spellman, archbishop of New York, U.S.; José Maria Caro Rodriguez, archbishop of Santiago, Chile; Teodosio Clement de Gouveia, archbishop of Lourenço Marques, Mozambique; João de Barros Camara, archbishop of Rio de Janeiro, Brazil; Enrico Pla y Daniel, archbishop of Toledo and primate of Spain; Manuel Arteaga y Betancourt, archbishop of Havana, Cuba; Joseph Frings, archbishop of Cologne, Germany; Juan Gualberto Guevara, archbishop of Lima, Peru; Bernard William Griffin, archbishop of London, England;

Emanuel Arce y Ochotorena, archbishop of Tarragona, Spain; Joseph Mindszenty, archbishop of Esztergom, Hungary; Ernesto Ruffini, archbishop of Palermo, Sicily; Conrad von Preysing, bishop of Berlin, Germany; Clement August von Galen, bishop of Muenster, Germany; Antonio Caggiano, bishop of Rosario, Argentina; Thomas Tien, vicar apostolic of Tsingtao, China; Giuseppe Bruno, secretary of the Sacred Congregation of the Council.

Two of the above died shortly after receiving the red hat. Cardinal Glennon died in Ireland on March 7, while returning to the United States, and Cardinal von Galen died in Germany on March 22, 1946.

Canonizations.—The death of Pius XI and subsequent war conditions somewhat slowed up the processes of canonization and beatification. Nonetheless, a number of persons were raised to sainthood or declared blessed. In 1938 three saints were solemnly proclaimed on Easter Sunday: Andrea Bobola (1591–1658), a Jesuit priest martyred in Russia; Giovanni Leonardi (1541–1609), founder of the Clerks Regular of the Mother of God; and the Spanish lay-brother of the Franciscans, Salvador da Horta (1520–1567). On May 2, 1940, Pope Pius XII canonized Mary Euphrasia Pelletier (1796–1868), foundress of the Sisters of the Good Shepherd and Gemma Galgani (1878–1903), tertiary of the Passionist order. In 1944 the canonization of Margaret of Hungary, daughter of King Bela IV, was announced. On Jan. 11 of the same year approval for the canonization of Mother Frances Xavier Cabrini, (1850–1917) U.S. citizen, was given. Thirty thousand persons packed the Basilica of St. Peter on July 7, 1946, for Mother Cabrini's canonization ceremony, which had been delayed by World War II. Sixteen cardinals and some 70 bishops were present; among the U.S. pilgrims were Archbishop Amleto Cicognani, apostolic delegate to the U.S., and Bishops Gerald P. O'Hara, Charles Greco and Bernard Sheil. Mother Cabrini had been beatified in Nov. 1938.

Beatified just before or during World War II were: Maria Giuseppa Rossella (1811–1880), foundress of the Congregation of the Daughters of Our Lady of Mercy, on Nov. 6, 1938; Maria Domenica Mazzarello (1837–1881), co-foundress of the Daughters of Mary Help of Christians, on Nov. 20, 1938; Rose Philippine Duchesne (1769–1852), who introduced the Society of the Sacred Heart into the U.S., on May 12, 1940. On Dec. 13, 1945, Pope Pius XII signed decrees approving the beatification of Maria Teresa Soubiran and Maria Teresa Veresi, both foundresses of institutes of religious women. The causes for canonization of Louis Grignon de Montfort, and the Jesuit missionaries Bernardino Realini and John de Britto, were also approved. A number of other causes were given attention, but wartime conditions rendered difficult the necessary interchange of documents. Notable among the causes promoted were those of Pope Pius X, who died in 1914, and of Kateri Tekakwitha, Mohawk Indian maiden of colonial days. On Nov. 24, 1946, Pope Pius XII solemnly beatified 29 martyrs who shed their blood for the faith during the Boxer rebellion in 1900; 26 of the martyrs were members of the Franciscan order.

Other Papal Official Acts.—Among the 11 congregations which carry on the executive functions at the Vatican is the Holy Office. It has always occupied a prominent position because of its activities in safeguarding faith and morals. In April 1938 the Holy Office issued a revised edition of the Index of forbidden books. It included all additions made since the previous Index published in 1929. Another revised edition of the Index, bringing the list up to date, was published in 1940. Titles of books currently

condemned continued to appear in the various numbers of *Acta Apostolicae Sedis*, official documentary publication of the Vatican. Some of the works placed on the Index within the decade were *Etudes sur Descartes*, by L. Laberthonniere; *Klosterleben*, by B. Assmus; three books of Pietro Martinetti; eight books of Alfred Loisy; three by Aloisia Piccareta; two German treatises by Raoul France and Gustav Mensching respectively; a New Testament dissertation by O. Lemaire; *Solus ad Solam*, by Gabriele d'Annunzio; *La Grande Sintesi* and *L'Acesi Mistica*, by Pietro Ubaldi; all the works of Alfredo Oriani; *L'enfant prophète Jesus*, by E. Fleg; *Der Christ als Christus*, by Karl Pelz.

Several decrees of the Holy Office attracted wide interest. In 1940 an official decision on the morality of eugenic sterilization was handed down. The practice, whether temporary or permanent, was condemned as unlawful. Also condemned was killing by the state of mental or physical defectives. This latter crime, it will be remembered, was indulged in by the nazis as part of their program for strengthening the race, saving money or carrying out experiments.

On April 1, 1945, the Holy Office issued a decree clarifying the ends of marriage. The decree condemned the opinion that the primary end of marriage is not the generation and education of children. There are, of course, secondary ends to which great importance attaches, but the decree called attention to the fact that confusion of thought and terminology should not be introduced by referring to them as primary.

In Oct. 1946 a decree was issued empowering bishops to designate priests who would be permitted to confirm the dying. The purpose of the decree was to make it possible for all to receive the sacrament of confirmation even though a bishop might not be readily available.

War conditions occasioned the granting of several privileges and the issuing of new instructions. The use of electric light or oils, other than olive oil or beeswax, was permitted for sanctuary lamps in time of emergency. Evening celebration of Mass, with full approval of ecclesiastical authorities, became common in the armed forces of the belligerents. Because of war conditions permission was granted in 1940 to anticipate the midnight Mass on Christmas during the afternoon of Christmas eve. Modifications in the Eucharistic fast were also allowed those engaged in war work, at the discretion of the bishop. In 1943 the Sacred Congregation of the Sacraments broadcast to all countries new instructions for caring for the Blessed Sacrament during war emergencies. Designated laymen were authorized to seek out the Sacred Hosts scattered by bombing. In 1944 the Sacred Penitentiary, the Roman tribunal which dealt with matters of the internal forum and decided cases of conscience, issued two notable decrees. Soldiers in danger of death in battle and civilians in danger during a hostile incursion were granted absolution without previous confession. German bishops were given power to permit priests to reconcile to the church Catholics who had lapsed under nazi persecution. In 1943 through the Sacred Congregation for Extraordinary Ecclesiastical Affairs, the pope granted to bishops all over the world the wartime faculty of dispensing their flocks from the precepts of fast and abstinence. Two days, Ash Wednesday and Good Friday for the Latin rite and equivalent days for Oriental rites, were excepted from the dispensation. The faculty, to be used at the discretion of the ordinaries, was for the duration of the war.

Previous to the war emergency a notable decree was issued by the Sacred Penitentiary on July 22, 1939, to the effect that a plenary indulgence might be imparted over the radio.

The Sacred Penitentiary is but one of three Roman tribunals which handle the judicial matters brought to the attention of the Holy See. The jurisdiction of the Sacred Penitentiary is limited, as was pointed out, to questions of conscience and the internal forum, either sacramental or nonsacramental. Among these is numbered the concession of indulgences and conditions for gaining them. The other two tribunals are Apostolic Signatura, which is the supreme tribunal of the Roman Curia, and the Sacred Roman Rota. To the Rota devolve all contentious cases, requiring judicial procedure with trial proofs, civil as well as criminal (not major ones), which are treated in the Roman Curia. The Rota attracts much attention because of its function of passing final decision on marriage cases. During the decade 1937-46, including the war years, the Rota devoted a considerable portion of its time to such cases. In 1937 decisions were rendered on 78 marriage cases, in 34 of which decrees of nullity were awarded. It was worthy of note that in 21 of these annulments, the petitioners were so poor that they were unable to pay even the ordinary expenses of judicial processes. In 1938 decisions were rendered in 80 marriage cases. Of the 74 appeals made for a declaration of nullity, the decree of annulment was granted to 30. In 1939 the decree of nullity was issued in only 19 cases; marriage was held to be valid in 46 cases. That year 25 petitions sought annulment because of lack of consent; only three decrees of nullity were granted for this reason. In 1940 of the 56 applications for decree of nullity, 39 were rejected; 14 were granted and the marriage declared null; two dispensations were granted of marriage contracted but not consummated; one was held void because of procedure. During the judicial year of 1942 the Rota heard 87 marriage cases. Of the total, 29 decrees of nullity were granted. While the number of marriage cases referred to the Rota from the lower courts varied somewhat, the ratio of decisions remained about the same. Normally, considerably less than half the applications for decree of nullity had been granted, and the remainder of the marriages upheld. The same proportion was discernible during the decade. In the majority of cases, annulments were granted for reasons readily ascertainable, such as impotence, insanity, force and fear; few were for defect of consent.

Because of the war, a memorable departure from usual procedure in matrimonial cases took place. On July 30, 1942, a papal rescript authorized the apostolic delegate to the United States to designate matrimonial courts to hear cases usually delegated to the Sacred Roman Rota.

Papal Pronouncements.—In the prewar and war years the thinking of the church continued to be clarified through papal encyclicals. The drive for cleaner motion pictures, which had gained momentum in the early 1930s in the United States, received papal backing in the encyclical letter *Vigilanti cura*, on clean motion pictures, issued in 1936 by Pius XI. The following year, in the encyclical *Firmissimam constantiam*, the Holy Father made manifest his anxiety about the state of the church in Mexico, where it was under many restrictions and was experiencing what at the time amounted to persecution. The same year Pius XI issued an encyclical on the Rosary. But the most outstanding documents of 1937 were the two encyclicals on naziism and communism. Both systems were uncompromis-

ingly condemned. The encyclical on naziism, known by its German title *Mit brennender sorge*, rejected racism as a theory and racial discrimination as a practice. Nazi denial of religious freedom was condemned, together with the totalitarian inhumanity of the nazi leaders. In the encyclical *Divini Redemptoris*, Pope Pius XI developed his teaching on contemporary social problems, showing that communist theory is opposed to Christian principles of social organization. Not only does it deny private property as an institution, but it distorts man's spiritual nature and leads to atheistic totalitarianism. While rejecting communism, the Holy Father pointed out patent abuses of the capitalistic system, emphasizing the duty of the state and of society in general to take effective steps to guarantee social justice to all.

One of the first acts of the new pope, Pius XII, was to issue an encyclical letter on the unity of human society (*Summi pontificatus* was the title). It appeared on Oct. 20, 1939, a short time after the outbreak of World War II. In it the Holy Father drew attention to two "pernicious errors," popularly known as racism and totalitarianism. The first of these, he said, denies the unity and solidarity of the human race; the other attributes to the state complete supremacy in all matters, including religion and morals. These errors, the pope maintained, imply a denial of the norm of human morality and destroy the true function of the family and the state.

Attention was focused on the progress and problems of the U.S. church in the encyclical *Sertum laetitiae* issued by Pius XII on Nov. 1, 1939. Praising U.S. Catholics for their generosity and devotion, the letter pointed out that forthright steps must be taken to correct social abuses and injustice in the United States. The letter praised the efforts of those endeavouring to apply the principles taught in the encyclicals of Pius XI on social questions. In 1940 there appeared an encyclical on the missions, and in 1943 one on the Mystical Body of Christ, clarifying some doctrinal points and warning against a false mysticism. In 1943 there was issued an encyclical letter on biblical studies, entitled *Divino afflante Spiritu*. In it the pope stressed the need and desirability of scripture study, emphasizing the fact that there was still much room for exegesis and research in this field.

Many of the statements issuing from the Vatican during the war years dealt with the problems of peace and reconstruction. Outstanding was the 1939 Christmas address of the pope, in which he laid down five conditions for a just and durable peace. These five points later came to be known as the Pope's Peace plan. The other allocutions of Pius XII on Christmas Eve each year during the war in some way touched on peace. In 1942, for example, he effectively summarized the moral principles governing the internal order of states and peoples, particularly as they were related to international order. In the 1944 Christmas address Pius XII developed the concept of democracy, stressing the rights of citizens, the nature of civil authority and the need of genuine democracy for the preservation of peace. The 1945 Christmas allocation treated of the internationalism, or rather the supranationalism, of the church. This subject was especially apt inasmuch as on that occasion the pope indicated the internationalizing of the college of cardinals through selection of prelates from many countries to receive the red hat.

Thirty-two new cardinals were created at a consistory in the Vatican on Feb. 18, 1946, placing Italians in the minority in the Sacred College of Cardinals for the first time. Cardinal Stritch of Chicago is shown receiving his red hat as he knelt before Pope Pius XII in St. Peter's cathedral



Two other outstanding addresses of Pius XII were the radio address of June 1, 1941, in which he forcefully summarized the social teachings of Leo XIII, Pius XI and his own earlier statements and the address of 1945 on the duties of women in social and political life. The former stressed the achievement of economic democracy and social justice as the necessary condition of peace; the latter pointed out the role which must be played by women in the reconstructing of modern society.

Church and the War.—Conflict with the government of the third German reich was the lot of the church almost from the first days of the Hitler regime. Although approximately one-third of Germany was Catholic, the nazis had repeatedly violated the rights of the church guaranteed in the concordat with the Vatican, ratified Sept. 10, 1933. By 1937 the conflict had become bitter. In February of that year Cardinal Faulhaber openly accused the nazis of persecution of religion, and on March 14, 1937, the encyclical of Pius XI condemning nazi racist doctrines was released. The nazis refused to discuss the problem with the papal nuncio and on May 1, Hitler warned that all churches opposing the philosophy of national socialism would be suppressed.

In 1938 the nazi attack upon Catholicism was intensified. Vilification of priests and religion was common in the press and in public. Mobs attacked the residence of Michael Cardinal von Faulhaber, and Bishop Sproll of Rottenburg was expelled from his diocese. The religious press was suppressed. So, too, were Catholic youth organizations. Educational establishments were systematically destroyed through the technique of preventing or discouraging youth from attending them. In Oct. 1938, Pope Pius XI assailed the vicious misrepresentations that the German and Austrian church was engaging itself in political affairs. In March 1938 the persecution of the Austrian church began. Under promise that the rights of religion would be respected, the Austrian hierarchy accepted the union of Austria with the reich. Almost at once the same persecution experienced in Germany was extended to Austria. Because of his protests, Theodore Cardinal Innitzer was attacked in his home in Oct. 1938, and put under protective guard. Nazi decrees on marriage, ethical matters and education widened the gap between the church and the state in both Germany and Austria.

In the months immediately preceding the outbreak of war the Holy See did everything within its power to avert the catastrophe. Pius XII seized every opportunity to issue appeals. He did not wish to alienate the Catholics of any of the nations involved, although his insistence that justice be done made it quite clear that the actions of aggressors were not approved. Through diplomatic channels the pope attempted to promote conferences among the powers, but without success. The pope made it clear that he did not wish to involve the Holy See in political or territorial disputes.

When Poland was overrun by the nazis and soviets, the Holy See expressed deep sympathy with the Polish people and condemned the attack upon that nation. On Oct. 7, 1939, the Vatican recognized the Polish government set up in Paris, France.

In Italy, meanwhile, all was not peace. Technically the Italian government had lived up to most of the provisions of the concordat entered into with the Vatican in 1929. Actually, extreme fascist elements had conducted an anticlerical and antipapal campaign which grew in intensity with the years. In 1940 the anticlerical aspects of fascism

became more manifest. Matters became more complicated because of the pro-fascist leanings of some of the clergy in the years before the war. As the excesses of fascism became more apparent, however, the gulf between the church and the fascist leadership widened.

In 1940 every effort was made in Germany and Austria to win the allegiance of younger clerics to the nazi cause. The report, later proved false, was circulated that the bishops, after their Fulda meeting, would issue a statement favourable to the nazis, and that diplomatic agreements had been reached between Germany and the Holy See. In Poland Augustus Cardinal Hlond declared that the country was enduring a "wave of unparalleled atrocities and cruelties." Subsequently a nazi decree ordered that baptism could be administered only by German priests, and nazi governors in Poland issued orders that hymns and prayers referring to Poland were prohibited. Church property was confiscated as occasion arose, and priests were imprisoned or executed.

Belgium predominantly Catholic, Netherlands 50% Catholic and Luxembourg nearly 90% Catholic, suffered in loss of church property and through nazi antireligious propaganda. On May 11, 1940, Pius XII pledged the moral support of the Holy See to these countries, condoling with their rulers on the nazi invasion. The bishops of Netherlands, in 1941, issued three strong pastoral letters: the first warned against Catholic participation in nazi or communism movements; the second denounced nazi usurpation or suppression of Catholic organizations; the third refused the sacraments to members of nazi groups. Similar protests were made by the Belgian hierarchy.

Belgian resistance grew among Catholics. In a pastoral dated Feb. 1, 1942, Joseph Ernest Cardinal van Roey of Malines refused to accept nazi domination of religion in Belgium. He also forbade holy communion to Flemish nazis wearing uniforms in church. The Benedictine abbeys of St. André, Mont César and Maredsous were confiscated by the nazis. In 1942 Father Weechmans was sentenced to eight years hard labour for publishing the Catholic journal *La Belge*. In Netherlands the Catholic papers were progressively suppressed when they refused to conform to nazi demands.

In Germany, as the war went on, hostility between the government and the hierarchy grew. In 1941 a pastoral of the German bishops cited four major protests: suppression of Catholic publications, disbanding of religious institutes and convents, closing of Catholic schools and prohibition against religious teaching in those remaining open, nazi propaganda seeking Catholic apostasy. Bishop (later Cardinal) von Galen of Muenster, in a series of sermons, denounced the methods of the gestapo against Catholics, as did Bishop Bornewasser of Trier. Archbishop Conrad Groeber of Freiburg declared that the war had increased the persecution of the church in Germany. In German-occupied countries the same situation was manifest. Clergy were arrested for saying anything against the invaders, and institutions were closed. Such was the case in Yugoslavia and the Balkans generally. On March 21, 1943, the Slovakian bishops denounced a nazi law forbidding the baptism of Jews. In Lithuania the bishops accused the nazis of violating their promises to respect religion. To make perfectly clear the position of the Holy See, the Vatican radio in 1943 stated categorically that wartime creation of new states would not be recognized. At the same time another broadcast condemned the atrocities of the Japanese.

The wartime situation in France did not present a clear-cut picture. Some 15,000 priests had been mobilized in the

French army as soldiers or officers; many were killed and others taken prisoner. The difficulty of caring for the faithful's religious needs was greatly increased under the Nazi occupation. Further complications arose as a result of the Vichy government's desire to aid religion; on Sept. 3, 1940, the antireligious laws of 1904 were repealed. Despite their dislike of the Nazis, a certain number of French Catholics felt sympathetic to the Vichy regime because of its abrogation of antireligious laws. Other Catholics could see no point in giving even partial approval to those whom they regarded as collaborators. The latter group, numbering many priests, were especially active in the resistance. A number of the French clergy distinguished themselves by opposing the Nazis at the risk of their lives or by carrying out their ministry under dangerous conditions; a number died in Dachau. In this way respect was won for the Catholic church; it continued into the postwar period. Another effect of the experiences of the war years was a strengthening of religious life among the people.

During the occupation years French Catholic journals opposing collaboration were suppressed by the Nazis, as were papal communications. French prisoners of war in Germany for the first two years after the fall of France were unable to receive holy communion. To combat anti-Semitism, French archbishops and bishops in pastorals and sermons condemned the barbaric treatment of Jews under the Nazi occupation.

With the progress of the war the Nazis grew more daring in their assaults upon religion. On Jan. 1, 1942, Dr. Alfred Rosenberg released a 30-point program for a Nazi national church. On March 22 of the same year the German bishops, in a joint pastoral, cited their protests against the Nazi program, charging the Nazis with wishing to destroy Christianity. At about the same time Cardinal Faulhaber denounced insults to the papacy, and Bishops von Galen and Bornwasser denounced a German government order interning priests in concentration camps. At the Nuremberg trials after World War II it was brought out that the Nazis had planned the complete destruction of the church once the war was won.

Outside the Nazi-occupied countries the hierarchy of the church made clear its position on the Nazi inhumanity. On Oct. 30, 1942, the hierarchy of Brazil condemned totalitarianism and urged all Catholics to defend their country in a just war in defense of Christian civilization. In a statement issued Nov. 14, 1942, the hierarchy of the United States reaffirmed their earlier disapproval of Nazism by declaring there could be no compromise with the axis. In the same year three Italian bishops protested against persecution of Slovenes by Italian authorities. In England the bishops kept urging a peace based on the announced papal principles, recognizing at the same time that no compromise with the axis powers was possible. Cardinal Hinsley especially stressed the fact that peace of a lasting character was possible only if moral principles were adhered to by large numbers of the people. Accordingly he initiated a movement, called *Sword of the Spirit*, which sought to unite all Christians in the defense of Christianity against the aggressive paganism of the totalitarian ideologies.

At the height of the war in 1943 the church suffered heavily from the conflict which had spread to all Europe and much of the Pacific. In Germany the Franciscan order found that 2,943 of its members had been conscripted into the German army as combatants; and during the year 1,200 German priests and members of religious orders were known to have been interned in concentration camps. All orders and the diocesan clergy were affected so that proper

spiritual ministrations to the people became progressively more difficult. In Belgium Canon Cardijn, labour leader, was imprisoned by the Nazis; Abbe Cordonnier was executed by the German authorities for aiding British airmen; Mgr. van Wayenbergh, rector of Louvain university, was sentenced to imprisonment. The bishop of Namur excommunicated the Rexist leader Léon Degrelle consequent to these attacks upon the church and human rights.

In the United States, chiefly through War Relief Services—National Catholic Welfare conference, Catholics contributed to relief drives. In 1943, 23 of the Catholic hierarchy joined with Protestant and Jewish leaders in signing a seven-point declaration on world peace. Widespread efforts were made, through churches and church organizations, to acquaint the people with the peace program and to prepare them for the formation of a postwar international organization. These efforts were continued up to the San Francisco conference of the United Nations in the spring of 1945. Shortly before the conference the Catholic hierarchy, simultaneously with other religious leaders, made clear the moral principles on which such an organization should be founded.

Spread of the war in the Pacific after Dec. 7, 1941, threatened the future of the church in that region. Japan had for some time recognized the legality of the church, and did not change its basic attitude during the war. Fortunately, in line with Japanese policy, the Vatican had progressively substituted native Japanese bishops for foreign prelates. Hence, when the war came little difficulty was experienced on that score. Apparently most Japanese Catholics saw no difficulty in fighting for their country. The church in Japan suffered a great loss, however, when Nagasaki and Hiroshima were wiped out by the atomic bombs. The church had become particularly strong in these cities. In other cities bombing damaged or destroyed churches just as in Europe.

Military operations did considerable harm to missions in the Pacific theatre. Chapels were destroyed and native peoples displaced. In the Philippines, chiefly because of the great loyalty of Filipinos to the United States, the church suffered heavily; the War Damages commission subsequently estimated loss of church and church-connected property at \$125,000,000. About half the churches in the islands were destroyed or in such a condition as to need major repairs. The economic plight of the people added to the difficulties of restoration of churches, institutions and schools. During the war U.S. missionaries who escaped internment were active with resistance groups. When the Japanese realized that the Philippines were lost, they resorted to wholesale destruction. It was at this time that several scores of foreign priests and religious were slain along with loyal Filipinos. Earlier in the war the Japanese had interned a number of priests and religious; some of them were transferred to Japan. Throughout the war supervision of religious affairs by military authorities was very strict. The same condition prevailed in other missionary areas, notably China. Several hundred missionaries were repatriated, and others were interned for the duration of the war.

As the war drew to an end, the antireligious nature of Nazism became even more apparent. On Aug. 19, 1943, the German bishops at Fulda accused the Nazis of open religious persecution. Bishop Dietz of Fulda asserted that beneath the Nazi doctrines were pantheistic ideas. Bishop (later Cardinal) Konrad von Preysing of Berlin vigorously denounced the Nazi attack upon human rights. Cardinal

Justin Seređi, primate of Hungary and archbishop of Esztergom, condemned the master race propagandists as tools of Satan.

When the nazis occupied Italy, the position of the church became precarious. In the centre and north of Italy priests who condemned terror and pillage were seized by the gestapo. The monks of the famous Benedictine abbey of Monte Cassino, founded by St. Benedict himself, were ordered by the nazis to leave their abbey and seek refuge in Rome. Famous treasures, both of the abbey and others sent for safekeeping from various parts of Italy, were seized and sent to Germany. The abbey was later used by the German troops as an observation post, and during the Allied drive through Italy it was destroyed by bombing. In the north of Italy ten rectors of Catholic universities were dismissed from their posts by the nazis. Seven members of the Salesian order were executed by the Germans during 1944. Throughout Italy churches were destroyed in the military engagements. The poverty of the people and their complete exhaustion made reconstruction a slow and difficult task.

The last year of the war witnessed bitter conflict between the church and the German and puppet governments. In the Netherlands, in retaliation for the pastorals condemning naziism and encouraging noncollaboration, clergy who read the letters from their pulpits were arrested. In Hungary Cardinal Justin Seređi was placed under close surveillance, and the Hungarian puppet government banned Catholic publications. Cardinal Hlond, primate of Poland, was arrested at Aachen by the gestapo. Later, when released at Paderborn on April 1, 1945, by the U.S. 9th army, he found that approximately 2,000 of the Polish clergy, including several bishops, had been executed or missing. In Yugoslavia it finally became known that during the war two-thirds of the hierarchy had died, been imprisoned or executed. At least several hundred priests were known to have perished in the Yugoslavian fighting during the war.

Total war damage to the Catholic churches of Europe was estimated at \$6,000,000,000, exclusive of schools and other religious buildings. Some 12,000 Catholic churches in the reich were destroyed or severely damaged. In Italy 65 churches of historic and artistic value were in ruins, and in London 55 churches were wrecked by flying bombs. The two Catholic universities to suffer most during the war were those of Nijmegen, Netherlands, and Louvain, Belgium.

In the Ukraine systematic persecution by the soviets finally succeeded in bringing the Ukrainian Catholic church under the domination of Moscow. An uncanonical synod, unattended by the hierarchy, declared the union with Rome, dating from 1596, to be abrogated as of March 8, 1946. Union with Moscow was forced upon Ukrainian Catholics, and the churches of priests who would not submit were forceably taken over by soviet emissaries. In Jan. 1946 Pope Pius XII, in the encyclical *Orientalis omnes ecclesias*, deplored the persecution of the Ukrainian church. Similar conditions existed in other Slavic countries. The war conditions had made possible the repression of Roman Catholicism among the Slav peoples by the Russians, who substituted the politically controlled Moscow patriarchate as the supreme religious authority.

At the end of World War II there was considerable rejoicing among Catholics in Europe generally. On Dec. 1, 1945, Archbishop Groeber of Freiburg, Germany, said catastrophe would have befallen Europe had the nazis won. The French bishops made an appeal for national union in

a spirit of reconciliation. When the Allies entered Rome the celebration was extensive. On June 11, 1944, about 10,000 officers and men attended a thanksgiving Mass in the cathedral of St. Mary of the Angels in Rome, and 15,000 Allied troops were present at the midnight Mass celebrated by the pope in St. Peter's. Immediately after the German armistice Cardinal Faulhaber led a Corpus Christi procession through bomb-shattered Munich, and on Christmas, 1945, curfew regulations were lifted to permit celebration of midnight Mass in Germany for the first time since 1939. Throughout the world the end of World War II was marked by thanksgiving services in the churches.

Population and Statistics.—Only estimates were available as to the Catholic population of the world. Accurate figures were lacking, as was also the case with other world religious groups. Most estimates placed the Catholic world population in 1946 at 400,000,000 or thereabouts. One set of statistics gave the Catholic population of various continents as follows: Europe 203,944,000; Asia 9,213,413; Africa 6,866,000; North America 47,056,724; South America 60,836,000; Oceania 10,468,000. These figures placed the total in 1946 about 60,000,000 fewer than 400,000,000, but they did not take sufficiently into consideration the growth of population and the number of baptized Catholics who might not be practising their religion. There were estimated to be 128,000,000 orthodox and schismatic Catholics in the world; and 135,000,000 Protestants. This made the total number of Christians about 601,000,000, of whom well over half were in union with Rome. Non-Christians in the world totalled at least 1,500,000,000, of whom 15,000,000 were Jews; 220,000,000 Mohammedans; and 1,319,000,000 members of other religions.

During the decade there were two elections to patriarchates. In 1937 Gregory Peter XV Agagianian became patriarch in the Armenian rite of Cilicia, Turkey. In 1940 Giuseppe da Costa Nunes became patriarch of the East Indies, Latin rite, with headquarters in Goa, India. The patriarchate of the West Indies, with its residence in Madrid, remained vacant. The total number of patriarchates, exclusive of that of all the west, which belongs to the reigning pope, was fourteen. There were four major patriarchates in the eastern church: the Coptic patriarchate of Alexandria, and Syrian, Maronite and Melchite patriarchates of Antioch in Syria. There were two minor eastern patriarchates: the Chaldean patriarchate of Babylon in Iraq, and the Armenian patriarchate of Cilicia, Turkey. The Latin patriarchates of Constantinople, Alexandria and Antioch remained merely titular. Minor Latin patriarchates in the west—Venice, Lisbon, the East Indies and the West Indies—were also merely titular.

In 1945 the Vatican maintained diplomatic relations with 36 countries. There were 26 nuncios, 2 internuncios, 6 chargés d'affaires. The pope appointed Bishop Joseph P. Hurley of St. Augustine, Fla., to act as regent ad interim of the apostolic nunciature in Belgrade, Yugoslavia. In addition the Vatican had 22 apostolic delegates, or representatives without diplomatic accreditation, in as many countries or territories. The representative in the United States was an apostolic delegate and did not enjoy diplomatic status. Pres. Franklin D. Roosevelt, at the beginning of World War II, appointed Myron C. Taylor as his personal representative at the Vatican, with the rank of ambassador but without diplomatic status. In 1939 there were accredited to the Holy See 13 ambassadors and 27 ministers and envoys extraordinary. In that year diplomatic relations were resumed between Lithuania and the Vatican, after having lapsed in 1932. Representatives were exchanged also with Uruguay for the first time since 1898.



Nuns entering the order of the Missionary Sisters of the Sacred Heart in Italy. The order was founded by Mother Frances Xavier Cabrini, who was canonized by Pope Pius XII at Rome on July 7, 1946, the first U.S. citizen to be so designated

In 1939 there were 39 papal nuncios and internuncios, accredited to as many nations, and 23 apostolic delegates.

There were 1,695 ecclesiastical jurisdictions in 1938 throughout the world. Of these 14 were patriarchates, seven of them titular; 1,194 archbishoprics and bishoprics; 487 vicariates and prefectures apostolic. In the United States there were 19 archbishoprics, three of them governed by cardinals, 94 bishoprics and two vicariates. In England and Wales there were four archbishoprics, including the cardinalitial see, and 14 bishoprics. Scotland had two archdioceses and four dioceses. Ireland had four archdioceses and 25 dioceses. Canada had 12 archbishoprics, 28 bishoprics and 7 vicariates.

In both Ireland and Canada one of the archbishops was a cardinal.

In 1941 there were 1,210 archbishoprics and bishoprics, 512 vicariates and prefectures apostolic and other prelates throughout the world. In that year the number of titular archbishops and bishops totalled 779. These titular prelates were without territorial jurisdiction of their own and were engaged in assisting residential prelates or in filling Vatican posts. In 1942 the number of residential sees, including archbishoprics and bishoprics, was 1,223. Since he became pope, Pius XII had created 72 new ecclesiastical jurisdictions. In that year ecclesiastical jurisdictions in the United States numbered 117. There were 2 cardinals, 20 archbishops, 97 bishops and vicars apostolic. The clergy numbered 36,580—23,818 diocesan priests and 12,762 regular. The total number of parishes and missions in the United States in 1942 was 18,985.

In 1943 the number of residential sees throughout the Catholic church was 1,226. In the United States ecclesiastical jurisdictions numbered 118. Catholics in the United States numbered 22,945,247. There were 24,031 diocesan

priests and 12,939 regular priests. Parishes and missions numbered 18,976; high schools 1,522; parochial schools 7,647. Seminaries were reduced by ten, to 193.

In 1946 the number of Catholics in the United States was estimated at 24,402,124, out of a total population of 133,053,845. There were 5 cardinals, 18 archbishops, 135 bishops, 28 abbots, 38,980 priests. Archbishoprics numbered 22; bishoprics and other jurisdictions 100. In Canada and Newfoundland there were 13 archdioceses; 34 dioceses; 9 vicariates apostolic and other jurisdictions. Of a total population of 11,795,000, Catholics were estimated as numbering 5,000,000. In England and Wales there were 4 archdioceses, 14 dioceses. The Catholic population of England and Wales was somewhat over 2,400,000. In Scotland, with a Catholic population of 615,000, there were two archdioceses and four dioceses. The Catholic population of Ireland was given as 2,773,920, out of a total of 2,951,000. In Northern Ireland the Catholics numbered 455,352, the total population being 1,303,000. Ecclesiastical jurisdictions remained the same: 4 archbishoprics and 25 bishoprics.

Year-by-Year Developments.—In 1937 every see was filled in the United States for the first time in many years. Three dioceses were raised to archdioceses, and four new dioceses were created. In the Vatican diplomatic service a *modus vivendi*, after a lapse of relations for 63 years, was arrived at by the Holy See and Ecuador. The *modus vivendi* with Czechoslovakia, executed in 1928, began to go into effect. At the coronation of King George VI, the pope was represented by Archbishop (later Cardinal) Pizzardo. Semi-official relations were entered into with the Nationalist government in Spain. Dennis Cardinal Dougherty of Philadelphia, Pa., was sent as papal legate to China and Japan. In loyalist Spain obstruction of the practice of religion was common, and on July 1, the Spanish hierarchy sent a joint letter to the bishops of the world protesting against the loyalist government. Pope Pius XI issued his encyclicals

against communism and nazism. On Feb. 3, 1937, the 33rd International Eucharistic congress was opened in Manila, P.I., with Cardinal Dougherty acting as papal legate. India celebrated the 50th anniversary of the establishment of its hierarchy. During the half century the Catholic population had increased from 1,660,000 to 4,000,000.

Seven cardinals died in 1938. In the United States two dioceses were raised to archdioceses and four new dioceses were created. During the last week of May 1938, 19 cardinals, about 300 bishops and archbishops and upward of 400,000 clerical and lay pilgrims from 40 nations assembled in Budapest, Hungary, for the 34th Eucharistic congress. In Canada the first national Eucharistic congress was held at Quebec, and in the United States the eighth national Eucharistic congress was held at New Orleans, La. The 150th anniversary of the first Catholic settlement in Australia was celebrated, and the 100th anniversary of the founding of the church in New Zealand. At Montezuma seminary in New Mexico the first ordination of Mexican priests took place. The seminary had been established by the American hierarchy because of disturbed conditions in the Mexican church.

Pope Pius XI died on Feb. 10, 1939. On March 2, Cardinal Pacelli, papal secretary of state, was chosen as his successor, taking the name of Pius XII. During the year four cardinals died. In the United States Washington was designated as an archdiocese, to be administered by the archbishop of Baltimore. Gallup, N.M., was constituted a diocese. Archbishop Spellman was installed in the see of New York, N.Y.; he also was designated ordinary of the armed forces. Archbishop Stritch succeeded Cardinal Mundelein in the see of Chicago, Ill. Pres. Roosevelt sent Myron C. Taylor to the Vatican as his personal representative. On Christmas Eve the pope announced his five-point peace program. The encyclical *Sertum laetitiae* was sent to U.S. bishops on Nov. 1. On Oct. 20, 1939, the Holy Father had issued his first encyclical to the Universal church on the unity of the human race.

Two more cardinals died during 1940; no vacancies were filled. In Spain the new government pledged its allegiance to the Holy See. The pope addressed an encyclical to Portugal on its eighth centenary as a nation. On May 7, 1940, a concordat was concluded with the Vatican.

In 1941 the ninth national U.S. Eucharistic congress was held in St. Paul, Minn., in June with Cardinal Dougherty as papal legate. Denver, Colo., was made an archdiocese, and Pueblo, Colo., and Honolulu were created dioceses. After the attack on Pearl Harbor the U.S. hierarchy pledged full co-operation in the war effort. In April 1941 Roderick Cardinal Villeneuve of Quebec appealed for unity in the war effort of Canada. In Latin America Catholic authorities showed themselves agreeable to the establishment of better relations with the United States. In Mexico the church was heartened by the tolerant attitude of Pres. Avila Camacho. In Brazil the Catholic university of Brazil, authorized in 1939 by a plenary council, was opened.

In 1942 the College of cardinals was reduced to 49 after three more deaths. By July Catholic chaplains in the armed forces of the United States numbered 1,101. The Bishops War Emergency Relief committee distributed \$1,322,493 for relief of prisoners of war and war sufferers. In Great Britain the Bournemouth Union of Christian Thought, representing Catholics, Protestants and Jews, presented an irreducible minimum on which religious people could support any political party. In the United

States Bishop Joseph Raphael Crimont, vicar apostolic of Alaska, celebrated his 50th anniversary as a bishop.

During 1943 six more cardinals died, and no vacancies were filled. Bishop Bernard Griffin, auxiliary of Birmingham, was named archbishop of Westminster, as successor to Cardinal Hinsley. On April 19 Vatican City began a weekly broadcast in Russian to prisoners of war and persons in occupied territory. Archbishop Spellman, ordinary of the U.S. armed forces, visited the soldiers on all fronts. Bishop Johannes Gunnarsson, S.M.M., was consecrated bishop for Iceland on July 7. Archbishop Thomas J. Walsh of Newark celebrated his episcopal silver jubilee.

Two cardinals died during 1944, bringing the membership of the Sacred college down to 41. One of them was Cardinal William Henry O'Connell of Boston, Mass. Before D-day, 95% of the Catholic troops in Britain received holy communion. In China Mgr. Zanin, Vatican representative, was imprisoned by the Japanese at Shantung, and Italian missionary priests were interned. On June 18 Bishop Picaud of Bayeux celebrated a *Te Deum* in his cathedral for the deliverance of France. In Germany it became known that one-fourth of the Catholic priests and seminarians called to the army were casualties. Mgr. Marella, apostolic delegate to Japan, visited Allied prisoners in the Japanese concentration camps. In Yugoslavia 80 Catholic priests were reported killed in Croatia. In the United States four new vicars were appointed to the military ordinariate in 1945, making the total 21. In Vatican City the *Osservatore Romano*, semi-official organ of the Vatican, appealed to the belligerents to relax the blockade. In Britain Bishop Bernard Griffin was enthroned as archbishop of Westminster on Jan. 18. The pope designated the states of Ohio and Indiana as ecclesiastical provinces, with metropolitan sees at Cincinnati and Indianapolis respectively. Two new dioceses were created: Lafayette, Ind., and Evansville, Ind. Bishop Richard J. Cushing, formerly auxiliary of Boston, was named successor of Cardinal O'Connell in that see. Pres. Roosevelt appointed Archbishop Spellman to the Protection and Salvage of Artistic and Historic Monuments in War Areas. While in Rome Archbishop Spellman celebrated a requiem mass for former Gov. Alfred E. Smith. Mgr. Walter S. Carroll was appointed by the pope as chairman of the Vatican commission for regulating religious, political and social affairs with the Allies.

In 1945 the death of three cardinals reduced the total number in the Sacred college to 38. Two of the cardinals who died were noted for their opposition to the nazis during the occupation: Cardinal Adolph Bertram, archbishop of Breslau, Germany, and Cardinal Seredi, archbishop of Strigonia and primate of Hungary. On Dec. 23, 1945, the pope announced a consistory and designated 32 prelates who would receive the red hat. In his Christmas address the Holy Father stressed the universal and supranational nature of the church. It was announced that of the 172 U.S. chaplains who had died during the war, 67 were Catholic priests. Commenting on the situation in Yugoslavia, *Osservatore Romano* stated that three obstacles stood in the way of social and religious peace in Yugoslavia: orthodox church opposition to a concordat with the Vatican, political and cultural divergences between Croats and Slovenes and the Serbs and the favouring of communism by Marshal Tito. On the death of Pres. Roosevelt memorial services were held in many Catholic churches throughout the world, including the American church in Rome. In a joint statement the British hierarchy proposed an eight-point program to the United Nations for the preservation of peace. The centenary of John

Henry Cardinal Newman's conversion was solemnly celebrated, with 500 delegates from 16 countries present. About 100,000 Catholics of Mexico and other American countries gathered at Guadalupe, Mexico, to participate in the golden jubilee celebration of the crowning of the Blessed Virgin of Guadalupe. On July 6, 1945, the Vatican announced the excommunication of Most Rev. Don Carlos Duarte da Costa, bishop of Maura in São Paulo state, Brazil, for preaching revolutionary doctrines. In November classes were resumed in most of the major theological schools in Rome; the American and British colleges still remained closed. In China Generalissimo Chiang Kai-shek welcomed back Bishop O'Gara. In the United States the diocese of Salina was established and the Concordia see was transferred to it. Omaha, Neb., was raised to an archdiocese, and the new diocese of Steubenville, O., was established.

Bishop Apollinaris Baumgartner, O.F.M.Cap., was consecrated and became vicar apostolic of Guam. Louis F. Budenz, managing editor of the *Daily Worker*, communist paper, returned to the church and joined the faculty of Notre Dame university.

In St. Louis, Mo., the Saint Vincent de Paul society celebrated its centenary.

In 1946 at the February consistory 28 new cardinals received the red hat; the other four received it privately. In the United States the diocese of Madison, Wis., was created. Sen. Robert F. Wagner embraced the Catholic faith. In January Pres. Harry S. Truman conferred the Congressional Medal of Honour on Father Joseph T. O'Callahan, S.J., of the navy; he was the first chaplain in the nation's history to receive this award. Shortly after the February consistory two of the newly created cardinals died. The Holy Father commemorated the 350th anniversary of the Ukrainian church's reunion with Rome by the encyclical *Orientalis omnes ecclesias*. Eugene Cardinal Tisserant, secretary of the Congregation for the Oriental Church, declared that the Catholic church east of the Curzon line was being systematically suppressed by the soviet. In April 1946 the pope made a plea to the world to combat famine in war-ravished lands without discrimination. Bishop D'Alton of Meath was named primate of all Ireland. In May Cardinal Griffin made a visit to the United States. The pope announced that China was raised from missionary status and now had its own hierarchy. The major religious orders elected new superior generals to replace those who died during the war: the Capuchins named Fr. Clement Neubauer, native of Milwaukee, Wis., the Society of Mary named Father Sylvester P. Juergens, provincial of the St. Louis province; the Jesuits selected Fr. John Baptist Janssens, a Belgian; the Dominicans chose Fr. Emmanuel Suarez. Two superior generals died: Most Rev. Valentine Schaaf, of the Friars Minor, and Very Rev. Henry I. Stark, who had just gone out of office as superior general of the Paulists. In Yugoslavia Archbishop Stepinac was put on trial and sentenced to prison by the Tito government; the Vatican announced that those who participated in the trial were excommunicated. Protests came from around the world to the Yugoslav government. The 300th anniversary of the death of the North American Jesuit Martyrs was celebrated in the United States, the pope making a special radio address on the occasion. In Oct. 1946 the third of the cardinals created at the February consistory died; he was Cardinal Augustin Parrado y Garcia, archbishop of Granada, Spain. Bishop Raymond A. Lane was elected Maryknoll's superior general in August.

Bishop Martin O'Connor, auxiliary of Wilkes-Barre, Pa., was appointed rector of the North American college

in Rome.

Catholic Awards in the U.S.—The Laetare medal award to outstanding Catholic laymen, on Laetere Sunday (fourth Sunday of Lent) was established by the university of Notre Dame in 1883. Within the decade 1937-46 the recipients were as follows: 1936 Richard Reid, editor; 1937 Jeremiah D. M. Ford, professor; 1938 Dr. Irvin Abell, physician; 1939 Josephine Brownson, founder of Catholic Instruction League; 1940 Hugh A. Drum, Lt. Gen. U.S. army; 1941 William Thomas Walsh, author; 1942 Helen C. White, author; 1943 Thomas F. Woodlock, writer and apologist; 1944 Anne O'Hare McCormick, journalist; 1945 G. Howland Shaw, sociologist and diplomat; 1946 Carlton J. H. Hayes, diplomat and author.

The Hoey awards, granted each year on the Feast of Christ the King to two Catholic laymen outstanding in the work of interracial justice, went to: 1942 Frank A. Hall, director of the National Catholic Welfare conference (N.C.W.C.) news service, and Edward LaSalle, president of Catholic Interracial council of Kansas City, Kans.; 1943 Philip Murray, president of Congress of Industrial Organizations, and Ralph H. Metcalfe, Negro field consultant of United Service Organizations; 1944 Mrs. Edward V. Morrell, promoter of educational work for Negroes, and John L. Yancey, civic leader; 1945 Paul D. Williams, co-founder of Catholic Committee of the South, and Richmond Barthe, sculptor; 1946 Richard Reid, editor, and Charles L. Rawlings, president of Detroit Catholic Interracial council.

The Catholic Action Medal, awarded annually by St. Bonaventure college to a layman outstanding in Catholic action, went to: 1936 Hon. Joseph Scott, lawyer and lecturer; 1937 Patrick Scanlan, editor; 1938 George P. Gillespie, leader in St. Vincent de Paul Society; 1939 William F. Montavon, director of legal department, N.C.W.C.; 1940 John J. Craig, director of Catholic Evidence Conference; 1941 John S. Burke, educational leader; 1942 Dr. George Speri Sperti, scientist; 1943 Francis P. Matthews, Supreme Knight of Knights of Columbus; 1944 Jefferson Caffery, diplomat; 1945 John A. Coleman, Catholic Charities official. (See also CATHOLIC ORGANIZATIONS FOR YOUTH; CATHOLIC RURAL LIFE CONFERENCE, NATIONAL; CATHOLIC WELFARE CONFERENCE, NATIONAL; LIBERALISM; MISSIONS, FOREIGN; PIUS XI; PIUS XII; SOCIETIES AND ASSOCIATIONS; VATICAN CITY STATE.)

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Rome

The decade 1937-46 witnessed extraordinary vicissitudes in the capital of Italy. Benito Mussolini planned to make it the centre of a new Roman empire, to be created by means of the alliance of fascist Italy with nazi Germany against the "demo-plutocracies," France and Britain. The strengthening of the Rome-Berlin axis was marked by the visits of Hermann Goering and Constantin von Neurath to Rome in the spring of 1937; the next year, on May 3, the city was bedecked with fascist and nazi banners in celebration of the visit of Hitler. The Romans were somewhat surprised and skeptical, however, at the official adoption of anti-Semitic theories and legislation, and pained by Mussolini's acquiescence in the German seizure of Austria, remarking that Italy had received the goose step (*passo romano*) and Germany, the Brenner pass (*passo Brennero*).

On June 10, 1940, when the German campaign had succeeded in the Low Countries and France appeared to be on the verge of collapse, Mussolini announced the Italian declaration of war amid the applause of an organized claque. The war, however, on which the fascist dictator and his supporters so lightly embarked, brought only disasters to Italian arms in North Africa, Greece and Albania. Reinforcement of the Italian armies by German troops and commanders in 1941 was the first stage of the German occupation of Italy and its capital.

The military reverses of fascism in 1942 and the apathy of the Italian people toward the war furnished the opportunity for a vigorous revival of clandestine anti-fascist and anti-monarchic elements in Rome, as elsewhere in the country. By the opening of the year 1943, the king, too, began conspiring with Generals Vittorio Ambrosio and Giuseppe Castellano to supplant Mussolini with a military government which would be able to negotiate with the Anglo-Americans.

On July 19, Rome itself was severely bombed, after public notice by President Roosevelt that Allied pilots would respect the neutrality of the state of Vatican City. Dino Grandi led a revolt in the grand council on the night of July 24-25, and when Mussolini appealed to the king for support, he was relieved of office, placed under arrest and succeeded by Marshal Pietro Badoglio as chief of the government. The population of Rome greeted the news of Mussolini's fall with genuine demonstrations of joy and hoped for immediate termination of the war.

Badoglio dissolved the Fascist party, promised a return to the pre-fascist constitutional system at the end of the war, and secretly made contact with the Allies. On Sept. 3, General Castellano signed the terms of surrender at Cassibile, hoping that the announcement of the armistice with the Allies would lead to an immediate reversal of sides by the organized armed forces of Italy under the king. When Brig. Gen. Maxwell D. Taylor was secretly brought into Rome on Sept. 6 to concert plans for the landing of an Allied airborne division, he found that General Ambrosio had left the capital, and was expected to return only on the 8th. General Giacomo Carboni was dubious of the ability of the Italian divisions under his command to hold the airports for the Americans, and the projected expedition was cancelled at the last minute.

The Italian government was surprised by General Dwight D. Eisenhower's announcement of the armistice on Sept. 8, and very faulty arrangements were made for the defense of Rome. While the king, Marshal Badoglio and several ministers made their way from Rome by automobile to Pescara and thence by sea to safety behind the Allied lines, General Carboni's conflicting orders permitted the German commander, Field Marshal Albert Kesselring, to occupy Rome, which had been proclaimed an open city on Aug. 14. The capitulation of Rome, which General Calvi di Bergolo authorized on Sept. 10, entailed the practical elimination from the war of Italy's organized armies.

From Sept. 11, 1943, until June 5, 1944, Rome was occupied by the Germans and administered by the Italian fascist republic, which Mussolini proclaimed after his rescue by German paratroopers. Many patriots, however, worked secretly with the Rome Committee of National Liberation, and when the Allied armies liberated the Italian capital, the committee refused to accept Badoglio as prime minister, feeling that he, a marshal of Italy, had left them in the lurch the year before. Ivanoe Bonomi, president of the committee, headed the new ministry which, after some delays, was recognized by the U.S. and British governments.

Rome, once more capital of Italy, welcomed the Consultative National assembly which was formed in Sept. 1945, and which aided the Council of Ministers in preparing for the Constituent assembly elected in June 1946. Lazio, the region of Rome, gave a majority of votes (677,201 to 619,216) in favour of the monarchy, but Italy as a whole decided in the referendum of June 2, 1946, in favour of the republic. The new constitution was to be drawn up by the Constituent assembly, which began its sessions in the capital late in June 1946.

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Rome-Berlin-Tokyo Axis

See FASCISM; GERMANY; HUNGARY; ITALY; JAPAN; UNION OF SOVIET SOCIALIST REPUBLICS; WORLD WAR II.

Rommel, Erwin

Rommel (1891-1944), German army officer, was born Nov. 15, 1891, at Heidenheim, Germany. He entered the German army in 1910 as a cadet captain and fought throughout World War I. Some reports said he had joined the nazi party shortly after its inception but these were never substantiated. Rommel, however, was commander of Hitler's personal headquarters during the marches on Vienna, Prague and Warsaw. In 1940 tank divisions under his command played a substantial part in the German victory in France, and in Feb. 1941 he was placed in charge of the Afrika Korps in Libya. Rommel established a reputation as a bold and daring leader, and nearly destroyed the British 8th army before he was stopped at El Alamein in June 1942. In Oct. 1942, however, the British under Gen. Sir Bernard Montgomery launched an offensive that drove Rommel out of Libya and into Tunisia. In March 1943, two months before the Allies destroyed the Afrika Korps in Tunisia, Rommel was called back to Germany for "reasons of health." Later that year he was given overall command of nazi forces in Italy, and in Dec. 1943 he was transferred to France as ground commander of Ger-

Standing at attention, U.S. soldiers watched a colour guard raise a historic U.S. flag in Rome during a Fourth of July celebration in 1944. The flag was the same one flown over the capital in Washington on Dec. 8, 1941, when war was declared on Japan, and on Dec. 11, when war was declared on Germany and Italy

man anti-invasion armies. Rommel was unable to halt the Allied invasion of Normandy in June 1944. He was severely wounded July 17 by Allied strafing planes, which caused his automobile to overturn. On Oct. 15, 1944, a German broadcast officially announced that he had died of his wounds. Later newspaper reports indicated, however, that he had been implicated in the plot of July 20, 1944, to kill Hitler, and had been allowed to commit suicide rather than stand trial and certain execution for his role in the conspiracy.

Roosevelt, Anna Eleanor

Mrs. Roosevelt (1884–), U.S. sociologist, newspaper columnist and government official (widow of Franklin D. Roosevelt, 32d president of the United States), was born Oct. 11, 1884, in New York city, the daughter of Elliott and Anna Hall Roosevelt. She married Franklin Roosevelt, her sixth cousin, March 17, 1905. Mrs. Roosevelt took an active interest in furthering her husband's political career after he was stricken with infantile paralysis. She broadened her social and political contacts, entered local campaign work and kept his interest in politics alive.

Intimate friends of the Roosevelts asserted that her help was invaluable during his first gubernatorial campaign in New York. They declared the president had complete reliance on her observations and said she frequently acted as his eyes and ears on political matters. After his election as president in 1932, she did not take part in his successive electoral campaigns but embarked instead on a vigorous career of speaking and writing. Her newspaper column, "My Day," became widely syndicated.

Mrs. Roosevelt was named (Dec. 19, 1945) by Pres. Harry S. Truman as a member of the U.S. delegation to the United Nations general assembly and was confirmed by the senate the following day. On April 29, 1946, she was elected chairman of the Commission on Human Rights of the United Nations Economic and Social Council (U.N.E.S.C.O.). She frequently clashed with soviet delegates on the definition of freedom. Answering the assertion by Andrei Y. Vishinsky, soviet vice-foreign minister, that the free speech allowed in the refugee camps threatened world peace, she stated that the U.S. and the soviet union had little hope of living together "without friction in the same world" unless both could concede the right of opposition.

Roosevelt, Franklin Delano

Franklin Delano Roosevelt (1882–1945) was born at Hyde Park, N.Y., on Jan. 30, 1882, only son of James Roosevelt and his second wife, Sara Delano Roosevelt. His father, a fourth cousin of Pres. Theodore Roosevelt, was descended from Claes van Rosevelt, a Netherlander, who emigrated to the American colonies in the 17th century.

Young Franklin's first teacher was his mother, a woman of forceful and resolute character. Later, tutors and governesses taught him French and German. At the 1,000-acre Hyde Park estate, he learned to ride, shoot and swim. He also became an expert sailor and developed a passionate interest in naval lore. From the time he was 7 years old, he was taken to Europe annually by his parents and when he was 15, he was sent to Groton, a fashionable preparatory school for boys in New England. There he proved to be a popular, though not an exceptional, student. Upon graduating in 1900, he went to Harvard university, where he established a reputation as an oarsman and was president of the *Crimson*. Although quick and

alert, he showed no special inclination for study. Upon graduation in 1904, he entered Columbia Law school and while studying there, he married (March 17, 1905) Anna Eleanor Roosevelt, a niece of Theodore Roosevelt. Admitted to the bar in 1907, he joined the law firm of Carter, Ledyard and Milburn. Roosevelt devoted himself to his legal practice until 1910, when he was offered nomination for the New York state senate. He was not expected to win, as no Democrat had captured the seat for Columbia, Putnam and Dutchess counties since the Civil War. Roosevelt, however, conducted an energetic campaign. His persuasive speechmaking, his famous name and his winning personality, plus the fact that the opposition was divided, won him the election.

At Albany, the newcomer fomented a "revolt" against Tammany's efforts to secure the nomination of William F. Sheehan, a "party regular," for the U.S. senate. Roosevelt led a group of 19 rebellious legislators who boycotted the party caucus. Because of the boycott, the Tammany supporters could not assemble the number of legislators necessary to approve the nomination, and Sheehan was defeated. Roosevelt was re-elected in 1912.

In 1912 Roosevelt espoused the presidential aspirations of Woodrow Wilson and during the campaign, he became a close friend of Josephus Daniels. When Daniels became Wilson's secretary of the navy, he appointed Roosevelt to an assistant secretaryship.

Roosevelt's activities during World War I brought him some stature in national politics. In 1920 at the Democratic national convention in San Francisco, he seconded the nomination of Alfred E. Smith for president. The convention, however, picked James M. Cox as its presidential candidate and Roosevelt as Cox's running mate. Roosevelt stumped the country, making more than 1,000 speeches, but nevertheless went down in defeat along with Cox. He then resumed his legal career.

The following year (1921), while vacationing with his family at Campobello island, New Brunswick, he was stricken with infantile paralysis and was paralyzed from the waist down. Thus, at the age of 39, he seemed destined to be a bed-ridden invalid. By sheer will-power, however, he built up his strength and within three years was able to move about on crutches. Up to the time of this tragedy, he had displayed no exceptional talents. Friends said that before his illness, he was inclined to be somewhat self-righteous and haughty.

In 1924 he was strong enough to return to his law work and to re-enter politics. At the Democratic convention that year in Madison Square Garden (New York city), he once more proposed Smith for the presidential nomination. Smith, however, lost out to John W. Davis. Four years later, Roosevelt appeared at the convention in Houston, Tex., and again nominated Smith. This time Smith won. Smith in turn wanted Roosevelt to run for governor of New York to bolster the ticket. Roosevelt at first refused on grounds of health, but finally agreed. In the elections, Smith was not only defeated but lost his own state as well; Roosevelt, however, carried New York by a narrow margin of 25,000 votes.

This reversal in their fortunes led eventually to the cooling of the close friendship between the two men, both forceful and strong-willed personalities. The breakup occurred when Smith, in the role of senior adviser, made recommendations to the new governor that the latter was disinclined to accept. Nevertheless, many of Roosevelt's accomplishments in the sphere of social welfare were regarded as an extension of Smith's earlier program. Roosevelt's principal gubernatorial achievements were passage

of several social welfare bills, including an old-age pension plan.

His re-election as governor in 1930 by the unprecedented plurality of 725,000 votes made him one of the leading Democratic contenders for the presidential nomination in 1932. At a time when the nation was plumbing the depths of a catastrophic depression, his record of sympathy for the "little man" had a strong vote-getting appeal. His pre-convention campaigning was astutely handled by James A. Farley; his speech of April 19, 1932, that the nation must devote itself primarily to the "forgotten man" and rebuild from the bottom up and not the top down, won enthusiastic approval from both farmers and labour. At the national convention that opened in Chicago, July 1, 1932, Roosevelt was nominated on the fourth ballot. Breaking with tradition, Roosevelt flew to Chicago to accept the nomination. Arriving in the city on July 2, he made his memorable acceptance speech in which he pledged himself "to a new deal for the American people."

Conducting a thorough campaign, he covered 34 states and made it his duty to talk with Americans in all walks of life. His irresistible optimism charmed many of his listeners, and in the November election he defeated Herbert Hoover by 22,821,857 to 15,761,841 votes, carrying 42 of the 48 states.

When Roosevelt was inaugurated as 32d president on March 4, 1933, a national crisis gripped the country. At least 12,000,000 wage earners were without work and 5,000,000 families—about $\frac{1}{4}$ of the population—were on relief or supported by charity. Industrial establishments operated far below capacity and thousands upon thousands of retail stores were shut. In the rural areas, many embittered farmers destroyed their crops rather than sell them at prices far below the cost of production. Worst of all, a banking breakdown in Michigan caused panic among the depositors in other states and by inauguration day, virtually every bank and stock exchange was closed.

The new chief executive strode into this atmosphere of appalling gloom and in his inaugural speech confidently declared that "this great nation will endure as it has endured, will revive and will prosper. So first of all let me assert my firm belief that the only thing we have to fear is fear itself—nameless, unreasonable, unjustified terror which paralyzes needed efforts to convert retreat into advance."

His brief address helped dissolve the near panic and hysteria that had shrouded the entire nation. Thereupon the president promptly called congress into special session, took the country off the gold standard and charted the reopening of the banks. He cut the veterans' pension system, made more than \$3,000,000,000 available for public works and endorsed legislation designed to alleviate the effects of the economic depression in agriculture and industry. Congress rushed through approval of his measures and at the end of the "100 days" of bold emergency action in which the president and congress worked in almost flawless harmony, the "New Deal" was underway.

Giving impetus to measures for economic recovery, Roosevelt then secured congressional authorization of the Agricultural Adjustment administration (AAA) on May 12, 1933 and the National Industrial Recovery act (NIRA) on June 16, 1933. Under the AAA, the administration planned to allocate federal aid to the farmers who in return agreed to government controls for reduction of crop surpluses. The NIRA, an even more radical reform measure than the AAA, constituted an effort to mobilize nearly all industrialists and workers to joint efforts for increasing employment, raising wages and shortening hours of work.

Neither act, however, worked out as Roosevelt had hoped and both proved unpopular. In May 1935 the supreme court declared the NIRA unconstitutional; the following year, it ruled similarly against the AAA.

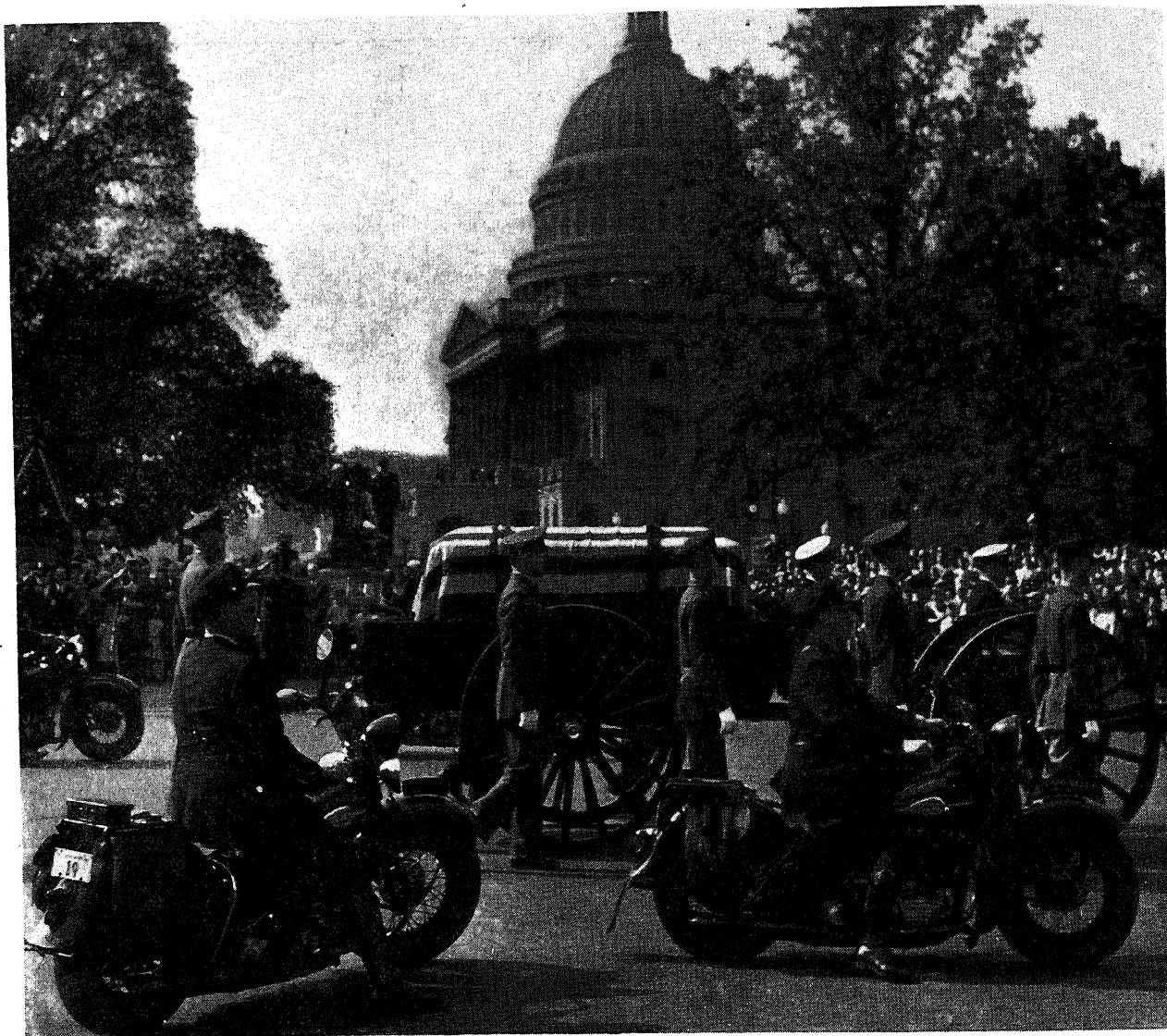
Other bills fared better. Among these were the Tennessee Valley authority, the Glass-Steagall Banking act, the Securities act, the Home Owners' Loan corporation and the Farm Credit administration acts. In dealing with relief problems, Roosevelt set up four new agencies—the Public Works administration, the Civilian Conservation corps, the Civil Works administration and the Works Progress administration (which supplanted the CWA in 1935). All were dedicated principally to building public works, thereby giving work to millions of unemployed.

In order to further its policies, the administration ignored current conceptions of budget-balancing and spent funds liberally. The two social groups that benefited most were the farmers and labouring classes. Agriculture benefited materially by the passage of such measures as the Soil Conservation act of 1936 and the second AAA; while labour received concrete advantages from the National Labor Relations act on July 5, 1935, which made collective bargaining mandatory upon both workers and employers. Other pro-labour measures sponsored by the Roosevelt administration were the Fair Labor Standards act and prohibition of child labour in industries operating in interstate commerce.

Though opposed by conservatives and big business, Roosevelt was renominated without opposition in 1936. Popular approval of his New Deal was reflected in the Democratic landslide of that year. He carried all states but Maine and Vermont in the electoral college and rolled up a popular vote of 27,752,309 to 16,682,524 for Alfred M. Landon, the Republican candidate.

Roosevelt's statement in his second inaugural address (Jan. 20, 1937) that measures should be taken to give decent living standards to the "one-third of the nation" that was "ill-housed, ill-clad and ill-nourished" keynoted the social philosophy of his second term. He urged legislation that would promise the states federal aid in unemployment insurance and asked for adoption of a federal old-age pension system. His social welfare program reached its high-point with congressional endorsement of the Social Security act, which he signed Aug. 1935. This was followed by other laws designed to improve the living conditions of the underprivileged, and by the establishment of such agencies as the Farm Security administration, a Federal Housing administration and establishment of the Federal Crop Insurance corporation.

Altogether, congress bowed compliantly to Roosevelt on major issues during the first five years of his presidency. But this "political honeymoon" ended abruptly after Roosevelt sent a message to congress (Feb. 5, 1937), asking for an act which would permit him to add up to 6 justices to the supreme court if those members past 70 did not retire. His request was motivated by fear that the predominantly conservative supreme court would declare invalid certain New Deal measures which he deemed vital. But for the first time, congress balked at following the presidential lead. Many Democratic leaders joined Republicans in opposing the court-packing measure, and in the historic battle that followed, Roosevelt suffered his first major defeat. His plan was rejected, and on Aug. 25, 1937, the president signed one drafted by his opponents, whose only major concession was a provision for retirement of supreme court justices for age. Roosevelt later contended that his



Funeral cortege bearing the body of Pres. Roosevelt past the capitol building in Washington, D.C., on April 14, 1945, along streets lined with honour guards

proposal to add new justices was only a means toward his ultimate objective of "liberalizing" the court.

During his second four years in Washington the president also was occupied with the problems of war and peace occasioned by the aggressive policies of Germany, Italy and Japan. He broke with isolationism in his "quarantine speech" in 1937, and subsequently aligned his sympathies with Britain and France. Thenceforth, the strengthening of United States defenses became one of his major preoccupations. He created a new Atlantic fleet in the spring of 1938 and advocated further substantial expansion of the U.S. naval arm.

After World War II started with Germany's invasion of Poland on Sept. 1, 1939, he voiced his hope that the United States could stay out of the conflict. Simultaneously, he proclaimed U.S. neutrality and banned the export of arms, munitions and war materials to all belligerents. Three weeks later he summoned congress and made a strong appeal to end the embargo. Congress subsequently modified the law to permit shipment of arms under an adulterated "cash and carry" plan. On May 10, 1940, Germany invaded France and the Low Countries. When it became apparent that the Allied armies could not stem the Nazi attack, he adopted a policy of extending all pos-

sible aid to Great Britain. In September of that year, he turned over 50 reconditioned destroyers to Britain in return for 99-year leases on 8 air and naval bases in British colonies in the western hemisphere.

Roosevelt was nominated for a third term at the Chicago convention in 1940. The Republican candidate, Wendell Willkie, accepted the president's foreign policy but vigorously opposed him on domestic issues. Roosevelt carried all but ten states and received a popular vote of 27,241,939, against Willkie's vote of 22,327,226 (about 5,600,000 more than Landon had received in 1936).

Roosevelt's victory was regarded as a majority's approval of his foreign policy and preparedness program. After the campaign, the president speeded the flow of war supplies to Britain and warned on Dec. 29, 1940, that an axis triumph would place the United States in the gravest danger. He also declared: "Our country is going to be what our people have proclaimed it must be—the arsenal of democracy." In his annual message to congress, Jan. 6, 1941, he gave evidence of his postwar thinking in declaring that "in the future days, which we seek to make secure, we look forward to a world founded on the four essential freedoms" (freedom of speech, freedom of religion, freedom from want and freedom from fear). (See FOUR FREEDOMS.)

In keeping with his intention to aid the Allies, the president sponsored the lend-lease bill, which congress passed over the strong opposition of the noninterventionists, on

March 11, 1941. Two weeks later, congress appropriated \$7,000,000,000 for implementing the measure, and war supplies were shipped immediately overseas.

Japan's attack on Pearl Harbor (Dec. 7, 1941) which occurred while Japanese envoys were discussing peace proposals in Washington, was denounced by the president as an act of "infamy." Thenceforth, Roosevelt promptly took steps to mobilize as rapidly as possible the United States for its role in the war against the axis; he said in Jan. 1942, that the U.S. over a two-year period would build 185,000 planes, 120,000 tanks and 18,000,000 tons of shipping. Congress thereupon voted two war powers acts which gave Roosevelt authority to see that these goals were accomplished.

In directing the war effort, Roosevelt was the complete boss, and as commander in chief of the nation's armed forces—a power conferred upon him by the constitution—his was the responsibility for all decisions. It was common knowledge that while he might delegate powers to members of his cabinet or to the directors of wartime agencies, such as Donald Nelson, James Byrnes and Leon Henderson, he made the final decisions and determined strategy.

In the midst of World War II, there was another presidential election in 1944. Maintaining that a continuation of Roosevelt's leadership was indispensable until the war had been won, the Democrats renominated him for a fourth term at their Chicago convention in July. Harry S. Truman was nominated as vice-president over Henry Agard Wallace. Roosevelt's Republican opponent, Thomas E. Dewey, like Willkie, accepted the major premises of the Roosevelt foreign policy but opposed what he called the Rooseveltian "autocracy." Roosevelt's majority in the electoral college was overwhelming, but his popular vote of 25,602,505 was about 1,600,000 less than what he had received in 1940. Dewey's vote of 22,006,278 was only slightly less than Willkie's.

The president continued to give much of his attention to co-operation with the Allies, especially Great Britain and the soviet union. He had several meetings with Winston Churchill on joint problems of strategy and war. Later Roosevelt and Churchill extended their conferences to include the soviet premier, Joseph Stalin. At the Tehran conference (Nov. 28–Dec. 1, 1943), where Stalin first met Roosevelt, the Big Three agreed on the scope and plan of their attacks on Germany and upon method of postwar treatment of the reich. At Yalta, the Big Three conferred for a second time (Feb. 4–11, 1945). There Roosevelt's acceptance of soviet demands regarding the Polish and German borders, on Balkan issues and on far eastern questions, were later harshly criticized. Perhaps the major achievement at Yalta was the agreement to set up a world organization to maintain peace and security and to call a meeting of the United Nations at San Francisco April 25, 1945, to prepare the charter of the proposed organization. (See also INTERNATIONAL CONFERENCES, ALLIED [WORLD WAR II]; UNITED NATIONS.)

Before leaving for his Yalta trip, the president outlined his postwar domestic policy in his annual message to congress, Jan. 6, 1945. In it, he declared that: "We must maintain full employment with government performing its peacetime functions. . . . Our policy is, of course, to rely as much as possible on private enterprise to provide jobs. But the American people will not accept mass unemployment. . . . There will be the need for the work of everyone willing and able to work—and that means close to 60,000,000 jobs."

After returning from Yalta, his health deteriorated rapidly and at the beginning of April 1945, he went to his

cottage at Warm Springs, Ga., to rest. On April 12, he suffered a massive cerebral haemorrhage and died at 3:35 P.M. His body was taken to the White House for funeral services, and on April 15, it was transported to Hyde Park for burial. (X.)

Highlights of the Decade

As one looks over the decade 1937–46, one realizes that 1937 was the year during which much of President Roosevelt's time and thought was spent on financial conditions within the United States. He suffered what was considered one of the worst reverses in congress when the court reform bill was defeated.

But in spite of anxiety over domestic affairs, he was never unaware of the international situation, which was becoming more and more serious. He tried to prepare the thinking of the people of the United States for the war which he saw approaching, and which he was desperately afraid might end by engulfing the United States as well as the rest of the world.

As historians read his "Quarantine Speech" delivered in Chicago on Oct. 8, 1937, they will probably realize that, harking back to the League of Nations, he was trying to apply some of the benefits which he felt could be obtained by some type of world organization for peace, even though none existed.

In spite of the reverses which he suffered in congress and in spite of the fact that those who had opposed him had felt safe to do so because the country was suffering an economic recession, the newspaper reporters were surprised to find that President Roosevelt's personal popularity seemed to hold during the 6,500 mi. trip to the Pacific coast which he started on Sept. 22.

President Roosevelt took these trips in spite of the physical effort which they entailed, because he felt the need of contact with the people, and this was the only way of observing the effect which government policies were having on the individual lives of the people.

President Roosevelt observed more from a train window than most people. He could look at the countryside, gauge what was happening to the land, to the forests and to the people. He returned from every trip not only refreshed by the human contacts, but with new security in his own judgment.

During 1938, he was persuaded to take an active part in trying to defeat for re-election some of the men who had opposed his measures in congress. It is often questionable whether a president is wise to take part in any but his own campaigns. In this year, a number of men returned to congress with deep-rooted resentment against President Roosevelt because of his open opposition, which did not make for greater harmony between the executive and legislative branches of the government.

The European situation was increasingly black, and it was evident that Hitler's mad career was soon going to plunge the European continent into another war. If Great Britain opposed Germany, as it probably would, most people thought that a pattern similar to that of World War I would develop. No one at that time foresaw the complete collapse of France.

The visit of the king and queen of England to the United States in early June of 1939 was an occasion which had a deeper meaning than the usual visit of the head of a great nation, making a polite call upon the head of another great nation.

During the summer of 1939, President Roosevelt made

a final appeal for world peace in a message to Chancellor Hitler and President Ignacy Mościcki of Poland, and King Victor Emmanuel of Italy, and the next day he sent another vain appeal to Hitler.

On Sept. 1, Germany invaded Poland and on Sept. 3, Great Britain declared war. Foreseeing the seriousness of the next few months, President Roosevelt called congress into extra session, on Sept. 13, to revise the Neutrality act.

As 1940 progressed, the third term became a burning question. It seemed probable that President Roosevelt would be drafted, and this happened on July 17, at the Democratic National convention in Chicago.

The author knows that he had thought very seriously about this issue, first because he did not think that in ordinary times a president should have more than two consecutive terms, and next because he doubted very much whether many men could stand the strain of the presidency for more than eight years. This led him, after much hesitation, to ask the leaders to give him Henry Wallace as a running mate, for he felt that Wallace more nearly understood the complex problems that might be facing the administration in case of war than any other man at that time.

One of the outstanding events of 1941 was the meeting in August of President Roosevelt and Prime Minister Churchill with their high-ranking military aides in Argentina bay, Newfoundland. Here the Atlantic charter was drawn up.

The attack on Pearl Harbor on Dec. 7, 1941, which was to force the United States into an active war on two separate fronts, was a great blow to President Roosevelt and his advisers as well as to the country.

In September President Roosevelt's mother died, and this forced upon him many personal responsibilities which he was obliged to neglect because of the press of public business.

In December, Prime Minister Churchill, with his military and naval aides, arrived in Washington. Americans were now in the war and the British were their allies.

The year 1942 was largely given over to preparation with the United Nations' leaders for the maximum war effort. Calls were made upon the American people on the home front for almost unbelievable goals of production. Many in the political opposition thought these goals were unattainable, but in spite of the demands for man power made by the army, the ranks of workers were filled by women, older men and younger boys and girls and the production was obtained.

One can only list the measures taken in quick succession during the year. The budget submitted for 1943 was \$58,927,000,000, and more than half of the nation's income was to go into war expenditures.

In April President Roosevelt proposed a seven point program to congress to keep the nation's economy from inflation: (1) heavier taxes; (2) ceilings on prices; (3) wage stabilization; (4) control of prices for agricultural products; (5) increased buying of war bonds; (6) rationing of scarce essential commodities; (7) the curtailment of installment buying.

As part of this program, he also proposed a \$25,000 limit on salaries after payment of taxes.

On May 30, 1942, soviet Foreign Minister Vyacheslav Molotov arrived secretly in Washington to confer with President Roosevelt and on June 18, Prime Minister Churchill arrived to discuss the war strategy of the United Nations.

Bernard M. Baruch headed a fact-finding commission to formulate a program to meet the emergency created by the rubber shortage. As a result, William M. Jeffers was appointed head of a program to combat this very serious shortage.

In late Sept. President Roosevelt toured the war plants of the country. In early November U.S. forces landed in Africa.

The latter part of Jan. 1943 he made his first trip overseas, this time to meet with Prime Minister Churchill and to confer with Generals Charles de Gaulle and Henri Giraud at Casablanca.

On April 20, he met President Avila Camacho of Mexico at Monterrey, Mexico. In August there was another meeting with Churchill in Quebec on war strategy.

In Nov. came the trip to Cairo, where he met with Generalissimo Chiang Kai-shek and Prime Minister Churchill. At the close of this conference, President Roosevelt proceeded to Tehran, as did Mr. Churchill, and here in the capital of Iran, Marshal Stalin met President Roosevelt for the first time.

Because of his preoccupation with the war, President Roosevelt established on May 28, 1943, an agency known as the Office of War Mobilization, and James F. Byrnes was named head with orders to "keep both our military and civilian economy running at top speed and to eliminate friction from rival agencies."

In early 1944, President Roosevelt was beginning to outline victory to the U.S. people and to give his own vision of what victory would ultimately mean. The author believes that the words of his address to congress should long be kept before the nation. He said the United States would have assurance of freedom from want from "the cradle to the grave." He also promised freedom from fear through the defeat and disarmament of Germany, Japan and Italy and any other nation which coveted a neighbour's territory.

In 1944, President Roosevelt had to make the decision of whether he would run again for the presidency. He accepted the nomination in a radio broadcast while on a trip to confer with General Douglas MacArthur and Admiral Chester Nimitz in the Pacific.

In Sept. he again met with Prime Minister Churchill in Quebec. This was purely a military conference, but President Roosevelt was beginning to think more and more of postwar organization, and a meeting was called in June at Dumbarton Oaks to lay the basis for that postwar organization.

It was after the trip to Tehran that President Roosevelt had a bout with a low fever which took him some time to shake off, but after a stay with Mr. Baruch at "Hobcaw," he returned in fairly good health.

In Feb. 1945 he took his last long trip, to Yalta to meet with Mr. Churchill and Marshal Stalin. On his return he was evidently tired but felt that he had made measurable progress in winning the confidence of Marshal Stalin, and his hopes were high that the three great allied powers would be able to work together to create a permanent peace as they had worked together toward the war victory which was now quite evidently in sight.

On the trip home he was under a great strain because his friend and adviser, Harry Hopkins, was evidently far from well, and his friend and military aide, Maj. Gen. Edwin M. Watson, had suffered a stroke and died on the way home.

For the first time in reporting to congress, President Roosevelt sat to give his speech, but when he left for Warm Springs, Georgia, in April for a holiday, all the doctors felt sure that with rest and care he could go on

through the four years of his fourth term. It was, therefore, a shock to everyone when the news came on April 12, 1945, that he had died in the Warm Springs cottage. For him, the anxieties and the long effort to serve his country and humanity had come to an end.

(See also DEMOCRATIC PARTY; NEW DEAL; UNITED STATES.) (E. RT.)

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Roques, Emile

Cardinal Roques, (1880—), French prelate, was born Dec. 8, 1880, at Graulhet, France. He studied for the priesthood, was ordained at the age of 24 and then continued his theological studies at Toulouse and Duesseldorf, later teaching and serving as superior at Catres seminary. He was elevated to the bishopric of Montauban in 1929 and became archbishop of Aix in 1934. A few days before the invasion of Brittany by the German wehrmacht in 1940, he was appointed archbishop of Rennes and primate of Brittany.

During the occupation, he vigorously protested the arrest of the directors of the Christian Agricultural youth and the deportation of Breton workers by the nazi occupation authorities.

He was named to the Sacred College of Cardinals in Dec. 1945 and was created cardinal at the Vatican consistory, Feb. 18, 1946.

Rosenberg, Alfred

Rosenberg (1893-1946), German politician, was born in the Baltic city of Reval (Tallinn), Estonia, and studied architecture and engineering at the Technological Institute of Riga, Latvia. After the end of World War I, he preached the doctrine that bolshevism was the creation of the "Jewish anti-Christ," but his ideas carried little weight until he came in contact with Adolf Hitler. Rosenberg joined Hitler, held the party together after the abortive Munich putsch of 1923 and became the premier nazi ideologist. He preached his racial and political theories in the columns of *Voelkischer Beobachter*, of which he was editor in chief. He also wrote numerous books on the subject, including *The Myth of the Twentieth Century*. Rosenberg was elected to the reichstag in 1930, and after Hitler came to power in 1933 was made reich leader of the National Socialist party. In 1934, he was appointed the fuehrer's deputy for supervision of the entire spiritual and ideological training of the nazi party. After the start of World War II, Rosenberg became a general in the S.S. (elite guards) and the S.A. (storm troops). He was appointed reich minister for the occupied eastern territories on July 17, 1941.

Captured in a Flensburg hospital, Germany, on May 19, 1945, by a British patrol, he was indicted Aug. 29, 1945, as a war criminal by the International Military Tribunal sitting in Nuernberg. He was found guilty of crimes against the peace, war crimes, crimes against humanity and of conspiracy to commit these crimes, and was sentenced to death by hanging, Oct. 1, 1946.

The sentence was carried out Oct. 16, 1946, at Nuernberg.

Rosenwald Fund, The Julius

See SOCIETIES AND ASSOCIATIONS.

Rotary International

See SOCIETIES AND ASSOCIATIONS.

Rowell-Sirois Commission

See CANADA, DOMINION OF.

Rowing

Prior to U.S. entry into World War II, even as late as 1940 and 1941, when it began to appear that war was inevitable, rowing in the United States continued on the same normal course that had been established in the early years of the decade 1937-46. Club rowing was at its height, schoolboy rowing was in the ascendancy, and intercollegiate rowing was on a high plane. True, even prior to 1937, public interest in the Poughkeepsie regatta, the "Kentucky Derby" of rowing, had begun to lag—crowds were progressively smaller than in the 1920s—but much had been done to improve conditions for the crews themselves, principally in the matter of much needed housing, and more crews were being invited and were accepting invitations to compete there. In 1941, the last year of the regatta before its discontinuance because of the war, a field of nine varsity crews, largest in the history of the regatta, participated.

In the intercollegiate field, the year 1937 marked in a way the beginning of a new era. The "Washington" influence, started in 1922 when Edward Leader went to Yale, was strengthened through three coaching changes at major rowing colleges in the east, Harvard, Cornell and Rutgers. At Harvard, Thomas D. Bolles, Washington graduate with an outstanding record for ten years as freshman crew coach at the University of Washington, was appointed head coach, replacing the veteran of the "old school," Charles Whiteside. With him went Harvey Love, former coxswain of Washington crews, as assistant. In the same year Rollin H. Sanford and Norman R. Sonju, both graduates of Washington rowing under Russell S. Callow, went to Cornell as head coach and assistant, respectively, replacing another of the so-called "old school" regimes, James Wray and his son, Clarke; Charles Logg, another Washington man, was made head coach at Rutgers. In 1940, Massachusetts Institute of Technology followed suit by securing Robert G. Moch, coxswain of the Washington Olympic crew of 1936, as head coach, and James McMillen, number five man on the same crew, as assistant. M.I.T. rowing improved vastly under Moch, and later under McMillen, who succeeded Moch upon his retirement in 1945.

Another 1940 change saw Fred Spuhn, Washington oarsman of the early 1920s and previously coach of the Yale 150-lb. crews, going to Princeton as head coach, where he took DeLos Schoch, also a Washington product, as assistant. In Nov. 1946, another important coaching change took place. Norman Sonju, until then assistant coach at Cornell, was appointed head coach at the University of Wisconsin. However, this latest "Washington" appointment was counterbalanced, so to speak, by the retirement of Edward O. Leader as head coach at Yale and the appointment of Allen Walz, lately coach at Wisconsin, to succeed him. With Walz went Joseph Burk, former Pennsylvania oarsman and twice winner of the famous Diamond skulls. This completed the influx of former Washington oarsmen who had turned coaches and brought the number to 20. In most instances these changes of personnel brought varying changes in rowing technique, broadly from the old orthodox English style with its long reach and accentuated body swing to what came to be known as the "arm and

leg" stroke, employing a somewhat shorter reach and considerably less body swing, with the accent on leg drive and arm pull.

The 1937 intercollegiate season was dominated by Washington in the west and Harvard and the U.S. Naval academy in the east. The Washington crew was the same to a man that had won the eight-oared event at the Olympic games in Berlin the year before. It defeated California in April and returned to Poughkeepsie to repeat its victory of the year before. Navy, the only crew to win from Harvard that year, placed second at Poughkeepsie, and Harvard launched its string of victories over Yale at New London, Conn.

It was in this year that Joe Burk began upsetting the timeworn principles of single sculling by winning both the U.S. and Canadian national championships with his "unorthodox" style of rowing. This comprised, broadly, a short reach, a minimum of body swing with very little lay-back at the finish and tremendous leg drive and arm pull combined with high stroking. During the next four years he achieved the enviable record of 46 victories, including the U.S. and Canadian national championships four times and the Diamond sculls in the Henley Royal regatta, Henley, England, twice. He won the right to represent the United States in the Olympic games in 1940, but was deprived of the opportunity when the games were later cancelled.

In England, Oxford won over Cambridge for the first time in 13 years, and England lost in three important events in the Henley Royal regatta. Germany won the Grand Challenge Cup for eight-oared shells, J. Hasenohrl, Ruderverein Ellida, Austria, the Diamond sculls and Tabor academy (Marion, Mass.) of the United States won the Thames Cup for the second successive year.

In club rowing in the United States, the National regatta of 1937, climax event of the season, continued to be open to all amateur oarsmen, but owing to the fact that it was held in July, long after the college crews had broken up for summer vacations, there were seldom, if ever, any college crews competing. Individual championships went to the individual competitors, but the winning club was picked on a point system with so many points for a first place, so many for second, etc., and places in all divisions, 145-lb., intermediate and senior, were considered. This was known as the Barnes Point system, and the club winning the most races in the National regatta each year received the Barnes Trophy. The West Side Rowing club of Buffalo won the trophy in 1937 with a total of 119 points and was able to repeat this success in 1938 and again in 1939. It was not until 1940 that the Penn Athletic club of Philadelphia was able to break West Side's string of victories. Indicative of the rising interest in club rowing during this period was the fact that while in 1937 there were but ten clubs entered in the National, the number had risen in 1939 to 17, and competition was keen. Joe Burk was the outstanding single sculler, representing the Penn Athletic club, from 1937 until he retired from active competition at the close of the 1940 season. The West Side Rowing club owed much of its success during that period to its sweep crews, fours both with and without coxswain, and eights. The other events, double sculls, pair-oared and quad-sculls, were well divided among all of the clubs.

The Schoolboy Rowing Association of America had been organized in 1935 to promote rowing in the high schools and preparatory schools of the country. Schoolboy rowing

was kept active during the war years, and material for most of the championship club crews in 1946 came from that source. In 1937, the annual S.R.A. regatta was held on Lake Quinsigamond, Worcester, Mass., over a distance of one mile. Tabor academy won the senior and junior eight-oared events, and Brooks school of North Andover, Mass., won the three-quarter mi., four-oared race.

In 1938, it was again Washington in the west and Harvard in the east among the college crews. Navy, defeated only by Harvard, in the Adams Cup regatta, came on to win at Poughkeepsie in the record time of 18 min. 19 sec. This left Harvard, undefeated, the mythical national champion. Owing to the fact that neither Harvard or Yale competed at Poughkeepsie, and therefore did not meet the western crews, the Poughkeepsie regatta had not always produced the true national champion. In Great Britain, Oxford again defeated Cambridge. In the Henley Royal regatta, Joe Burk won the Diamond sculls for the first of the two times he was to win it; the London Rowing club won the Grand Challenge Cup and Kent school (Kent, Conn.), of the United States, won the Thames Cup. The West Side Rowing club of Buffalo again won the Julius Barnes trophy in the National regatta with 114 points. Joe Burk was unopposed in the senior single-sculls event, so won by simply rowing over the course. In the Schoolboy Rowing Association regatta at Princeton, N.J., Lafayette High school of Buffalo won the senior eight-oared event, Haverford school of Haverford, Pa., won the junior eights, South Kent school (Kent, Conn.) won the three-fourths-mile, four-oared race, and Harvey Hutcheon and J. G. Godauer, Jr., both of Canada, won respectively the senior and junior single-sculls events.

Full Tide.—In 1939, rowing enjoyed a banner year, particularly in Great Britain, where in July the one-hundredth anniversary of the Henley Royal regatta was celebrated in England. In the United States, the National regatta attracted the largest number of entries in many years and the Dad Vail Rowing association, so named in memory of Harry Emerson Vail, for many years rowing coach at the University of Wisconsin, was organized with C. Leverich Brett as chairman and Allen Walz as secretary-treasurer. The association was comprised of smaller rowing colleges and colleges new to the sport, not yet ready for competition among the major rowing schools. The original membership included Manhattan College, New York, N.Y.; Rutgers university, New Brunswick, N.J.; Boston university, Boston, Mass.; Rollins college, Winter Park, Fla.; Marietta college, Marietta, O.; Dartmouth college, Hanover, N.H.; Williams college, Williamstown, Mass.; Washington and Lee university, Lexington, Ky.; American International college, Springfield, Mass.; and the University of Richmond, Richmond, Va. It was organized to foster rowing among these and other colleges new to the sport, to facilitate the arranging of schedules for races among these crews and to provide for an annual climax race similar to that held at Poughkeepsie among the major rowing colleges of the country. As a result, the first Dad Vail Association regatta was held at Red Bank, N.J., on May 20, 1939, under the auspices of Rutgers university. Seven crews were entered in the varsity race, which was won by Rutgers. Thereafter the Rutgers crews more or less dominated the Vail regatta, and the feeling that they should step aside and enter competition in the major field seemed to be gaining support.

The greatest event of 1939 in the rowing world was the celebration of the centennial of the Henley Royal regatta at Henley, England, mentioned above. The regatta offered competition in heats in nine events, covering a

period of four days, and entries included the largest number of foreign crews in the long history of the regatta. Of the nine events, three were open to eight-oared crews, two, the Grand Challenge and the Thames Cups, to all-comers and one, the Ladies Plate, limited to English crews. The Thames Cup, however, was limited to crews that had not previously won either the Grand or the Stewards Cup for fours. All entries were strictly amateur. The two open events were dominated by U.S. crews, Harvard winning the final in the Grand Challenge from the Argonaut Rowing club of Canada, Tabor academy winning over Kent school in the Thames Cup. There were also three events open to four-oared crews. The Stewards Cup was open to all-comers, the Wyfold Challenge Cup was restricted, with qualification requirements similar to those for the Thames Cup for eights, and the Visitors Challenge Cup was limited to English crews. The excellent Swiss four from the Zurich Rowing club won the Stewards Cup, and two good English crews triumphed in the other two, Trinity hall of Cambridge winning the Visitors and Maidenhead Rowing club winning the Wyfold. The three remaining events were open to all amateurs and consisted of the Diamond sculls for single scullers, the Silver Goblets for pair-oared crews and the Centenary for double sculls. Joe Burk of the United States won the Diamond sculls for the second consecutive year, Trinity hall of Cambridge university won the Goblets, and the Centenary, on the program for the first time, was rowed to a dead heat by the English pair, John Beresford, Jr., and L. F. Southwood, and the powerful Italian combination of J. Scherli and Broschi.

In the intercollegiate field, Cambridge beat Oxford in the annual Putney-to-Mortlake classic, and the University of California left no doubt about its national ranking in the United States by winning the 1939 Poughkeepsie race in the record time of 18 min. 12.6 sec. for the four-mile course there. Harvard again defeated Yale in their annual duel at New London.

For the third consecutive year the West Side Rowing club won the Julius Barnes Trophy at the 1939 National regatta, held at Detroit, Mich. Lafayette High school of Buffalo, Shrewsbury High school of Shrewsbury, Mass., and Brooks School of North Andover, Mass. divided the sweep events in the Schoolboy regatta at Cambridge, Mass., winning respectively the senior eights, junior eights and fours. Michael Popaw of Roman Catholic High, Philadelphia, won the senior single sculls and Edward Smith of Commerce High, New York city, won the junior singles.

War Ebb.—By 1940, rowing, along with other sports in the international picture, began the decline that was to reach its lowest ebb during the war years of 1943 through 1945. Cancellation of the Olympic games in 1940 took much of the lustre from rowing in the United States, but otherwise it continued along normal lines through 1941. Cornell won the mythical Eastern Sprint championship in 1940 but placed second to Washington, recognized as national champion, at Poughkeepsie. That year marked the first of a three-year trial period for Princeton at Poughkeepsie, a definite step toward the improvement of the regatta. Harvard defeated Yale, and Rutgers again won the Dad Vail Trophy. The Nationals were held at Red Bank, N.J., where Joe Burk emerged as national single sculling champion for the last time before retiring from competition, and the Penn Athletic club won the Barnes Trophy over a field of 16 entries. U.S. entries went on to dominate the Royal Canadian Henley regatta at St. Catharines, Ontario, a week later. There was no Henley Royal regatta in England, an important rowing event that continued to be a casualty of the war. The Schoolboy Association regatta

was held at Princeton, N.J. Browne and Nichols school of Cambridge, Mass., won the senior eights and Shrewsbury High school took the junior eights and four-oared events. S. D. Zink of Belleville High school, Belleville, N.J., won the senior single sculls and Edward Smith of Commerce High repeated his 1939 performance in the junior sculls. In 1941 the Poughkeepsie regatta boasted its largest number of entries, nine crews competing in the varsity race, which Washington won. Harvard again defeated Yale at New London, and Rutgers retained the Dad Vail trophy.

The 1941 National regatta was held at Minneapolis, on the Mississippi river, farthest west it had ever been held, and was attended by 16 clubs. Undine Barge club of Philadelphia won the Barnes trophy, gaining all of its 97 points in the 145-lb. division. Theodore A. DuBois of the Winnipeg Rowing club, Canada, succeeded Joe Burk as national single sculls champion. Hun school of Princeton, N.J., Shrewsbury High, and Roman Catholic High of Philadelphia shared honours in the usual three sweep events, the senior and junior eights and the fours, in the Schoolboy Rowing Association regatta at Camden, N.J. Howard McCreesh of St. Thomas More High school, Philadelphia, and John Ryan of Dobbins Vocational school, Philadelphia, won the senior and junior sculling events.

By the spring of 1942, the United States was at war, and the armed services were beginning to make inroads on the number of club and college oarsmen. Still the calibre of the crews was high and competition was good, though limited by the absence of the Poughkeepsie and New London regattas, both cancelled for the duration of the war. Yale and Harvard did meet in a two-mile regatta held at Derby, Conn., which Harvard swept, and shortly thereafter Yale announced that rowing there would be discontinued for the duration. Competition for Washington ended where it began, with a victory over California at Seattle in April.

The National regatta, held at Philadelphia, climaxed the club rowing season in 1942. Joseph Angyall became sculling champion, and the Fairmount Rowing association of Philadelphia won the Barnes trophy in a field of 13 entries. The Royal Canadian Henley, comprising a field of 11 entries, was won by the Argonaut Rowing club with a total of 60 points. The Schoolboy regatta was again held at Camden, N.J., where Lafayette High of Buffalo won the senior eight-oared event. Haverford school of Haverford, Pa., won the junior eights and St. Andrews school of Middleton, Del., took the four-oared race. Larry Kieffer of Roman Catholic High and Joseph Intracaso of William Howard Taft High, New York city, won the senior and junior single sculls.

The 1943 intercollegiate season was short and marked by the absence of Syracuse university, Syracuse, N.Y., as well as Yale. Owing to the shortage of baggage cars for transporting rowing shells, visiting crews for the first time had to row in shells borrowed from the host school. On the west coast, California dropped rowing, leaving Washington without competition, and the Dad Vail Association regatta was cancelled. Club rowing continued but also on a reduced schedule, and performances generally were below par. By the end of the 1943 season, Princeton and the University of Pennsylvania, Philadelphia, Pa., had been added to the list of colleges dropping rowing for the duration, and Harvard announced that it would row informally only, making no trips away from home. The Fair-

mount Rowing association again won the Julius Barnes trophy at the National regatta, held at Philadelphia, and Roman Catholic High school won the schoolboy championship for eights. St. Andrews school won the four-oared event and William Barr of Northeast High school, Philadelphia, became schoolboy sculling champion. Junior events in eights and sculls were not held.

In the summer of 1943, the navy inaugurated its V-12 program for officer training in many of the colleges, and this proved to be a great boon to intercollegiate athletics. As a result, four eastern colleges, Columbia, Cornell, Harvard and M.I.T., plus the Naval academy, were able to maintain rowing in a small way; they developed crews and rowed a greatly curtailed schedule of races during the war. Washington continued rowing through 1944 and 1945, but only as a part of the physical training program for the navy unit there. Club rowing was hard hit in 1944 and 1945 so the National regatta was cancelled in both years. Schoolboy rowing continued, and the Schoolboy Rowing Association regatta was held at Philadelphia both years. Newcomers to the win column in 1944 were Grosse Pointe High school of Grosse Pointe, Mich., in the senior eights, Bennett High of Buffalo in the senior fours, Wyandotte High of Wyandotte, Mich., in the junior fours and John B. Kelly, Jr. of Penn Charter school, Philadelphia, in single sculls. St. Andrews school won the senior eights in 1945, with La Salle High school of Philadelphia gaining its first victories by winning the junior eights and double sculls, a new event in the regatta.

Revival.—It was not until the spring of 1946 that prospects began to look brighter in the rowing world. With the war at an end, former oarsmen began drifting back, and the result was an immediate upsurge in rowing, as in all sports everywhere. In the intercollegiate field, Princeton, Pennsylvania, Rutgers, Wisconsin, California and Washington all returned to competition, and the improvement in performance was immediately noticeable. The eastern crews, including Wisconsin from the "near east," rowed a fair schedule of races, some of them competing in as many as six races. The Poughkeepsie regatta was not renewed, nor was the New London regatta, but Yale belatedly turned out a crew, and Harvard and Yale renewed rowing relations with a mile-and-three-quarters race at Boston, which Harvard won. In lieu of the Poughkeepsie regatta, a nine-crew regatta was held at Annapolis on May 11 over the mile-and-three-quarters Severn river course. A big, well-drilled Wisconsin crew rowed 35 strokes per minute over the entire course to win the varsity race and become the eastern champion for 1946. They repeated their triumph twice more in the east, once at Philadelphia and a week later at Ithaca, N.Y.

The National regatta returned to the rowing scene in 1946 at Philadelphia, the Detroit Boat club winning the Julius Barnes Point Trophy with 135 points. There were 17 events including, for the first time in many years, two pair-oared races. Fairmount Rowing association won the pairs with coxswain, and the Vesper Boat club of Philadelphia won the pairs without coxswain. The Schoolboy regatta was again held at Philadelphia. La Salle High school dominated the racing, winning both eight-oared events, the quad sculls and double sculls. It was the first time quad sculling had been included on the program. West Catholic High of Philadelphia won the senior fours, and Wyandotte High, Mich., the junior fours. The single sculling championships went to Joseph McIntyre of West Catholic High in the senior event and John Erwin of

Northeast Catholic High in the junior.

The highlight of the year was an innovation in intercollegiate rowing, the 2,000-metre International Lake Washington regatta, staged by the University of Washington, the Washington Athletic club of Seattle and the people of Seattle, Wash., and vicinity on June 22, 1946, at Seattle. Eight varsity crews, including Cornell, Harvard, M.I.T., and Rutgers from the east, Wisconsin from the midwest, California and Washington from the west and the University of British Columbia, Vancouver, from Canada, attended, all expenses paid. The race was preceded by a program of water sports and was witnessed by an estimated 150,000 people. All crews rowed in shells borrowed from the University of Washington and built by the noted shell builder, George Pocock, of Seattle. Going into a head wind, Cornell won in the slow time of 7 min. 19.7 sec. with M.I.T. second, Washington third, Wisconsin fourth, Harvard fifth, Rutgers sixth, California seventh and the University of British Columbia last. Less than six seconds separated the first five crews. (R. H. Sd.)

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Roxas y Acuna, Manuel

Roxas (1892–), Philippine statesman, was born Jan. 1, 1892, in Capiz, a small town on Panay Island in the Philippines. Educated in English-language public schools, he entered the University of the Philippines college of law, graduating (1913) with an LL.B. He was a law professor at the National university, 1915–16, later returning to his native province to practice. In 1921 he was elected to the house of representatives, later becoming speaker of the house. Roxas was a frequent visitor to Washington as a member of Philippine independence delegations between 1923 and 1933.

In Nov. 1938 Roxas joined the Manuel Quezon cabinet as secretary of finance. Shortly after the Japanese attack on the Philippines, Roxas was assigned Dec. 16, 1941, as liaison officer and aide to Gen. Douglas MacArthur. After the latter went to Australia, Roxas remained for a while on Corregidor and escaped to Mindanao.

Later, Roxas turned up in the pro-Japanese Jose Laurel government as a cabinet minister and helped draft the constitution of the "independent Philippines" that declared war on the United States, and also headed several important government agencies. Roxas, however, claimed that he used his position to carry out secret espionage and sabotage activities; his statements on this subject were supported by Gen. MacArthur. He was subsequently cleared of collaborationist charges. After the end of the war, he was unanimously elected president of the reconstituted senate and campaigned for president in early 1946. On Jan. 21 he was nominated for the presidency by the liberal wing of the Nationalist party. His opponent, Sergio Osmeña, was nominated by the party's conservative wing. In the elections of April 23, 1946, Roxas was elected; he was inaugurated May 28, 1946.

Royal Societies and Associations

See SOCIETIES AND ASSOCIATIONS.

Royce, Ralph

Royce (1890–), U.S. army officer, was born June 28, 1890, in Michigan. He was graduated from the U.S. military academy at West Point in 1914, was commissioned a second lieutenant in the infantry and was promoted

through the grades to lieutenant colonel in 1935. He was raised to the temporary rank of a brigadier general in April 1941.

After the U.S. entry into World War II, Gen. Royce was in command of U.S. bomber forces in Australia that carried out raids against Japanese bases in the Philippines in 1942. Promoted to temporary rank of a major general in 1942, he was made commander in Sept. of that year of the 1st U.S. air force at Mitchell Field, New York. The following April (1943) he succeeded Gen. Lewis Brereton as commander of U.S. forces in the middle east. Later, Gen. Royce relinquished this post and devoted most of his energies to improving U.S. relations with Saudi Arabia. In 1944, after the Normandy landings were under way, it was disclosed that Gen. Royce had supervised the establishment of a French-U.S. air force.

Ruanda and Urundi

See BELGIAN COLONIAL EMPIRE; MANDATES.

Rubber

In the interval between the two world wars the rubber industry alternated between feast and famine. Crude rubber prices wavered between \$1.25 and less than three cents a pound; dealers in tires and tubes were constantly cutting prices, while the efforts of large research staffs made the end-products more serviceable and more saleable. All over the world rubber goods were made more plentiful, of better quality and at lower cost, so that rubber served more uses each year. This urge to find new outlets for the large supplies of natural rubber prevailed during the periods of abundance, frequently even when the uses did not seem to be based upon the superiority of rubber. Such, for example, were the attempts to make highways and composition roofs despite the poor aging of rubber on exposure to sunlight. In the decade 1937-46 there was no scarcity of rubber from natural causes, but only from artificial causes, such as war or government restrictions placed upon its sale.

Table I.—World Production of Natural Rubber, 1937-41

	Short tons*
1937	1,306,000
1938	975,000
1939	1,108,000
1940	1,562,000
1941	1,680,000 (est.)

*Although the long ton of 2,240 lb. is used exclusively by the industry as the unit of measure for raw rubber, the short ton is employed in this article at the request of the editor in the interest of uniformity.

Shortages of this nature seemed destined to be of short duration. In proportion to their severity they brought to bear forces which corrected them and tended to make rubber more plentiful. Thus, the pattern of the restriction invoked by the British (Stevenson act) in 1922 had brought more rubber from the Dutch possessions and initiated the Firestone estates of nearly 100,000 ac. in Liberia. Again, after 1934, the joint restrictions of the British, Dutch and French governments, under the workings of the International Rubber Regulation committee, had forced out from the native estates of the far east large amounts of rubber which could be kept off the market only by a high export tax paid by the native producer. Moreover, under the threat of the control of world markets, timely research was launched in many laboratories in Germany, the U.S.S.R. and the United States on synthetic rubber which gained full fruition only during World War II. Although this effort had been steady and systematic for 20 years, the results of the scientific studies were closely held to small-groups in each of the countries. The fall of Singapore and the Netherlands Indies to the Japanese in 1942 stopped at its source the production of 90% of the world's rubber, thus creating

the most acute shortage in the history of the industry. The successful and timely researches which had been conducted on synthetic rubber, its source materials, its properties and uses, were integrated into a vast production program. In the United States alone by 1945, after a 3 years' construction program, the capacity to make synthetic rubber exceeded 1,000,000 tons a year, a potential which had taken the plantation industry a full 25 years to achieve.

Table II.—Natural Rubber Imports (short tons)

	United States	United Kingdom	France	Germany	Japan	Canada
1937	663,631	101,932	66,161	109,950	69,670	40,417
1939	544,710	77,543	72,102	84,000*	47,433	36,409
1940	908,952	223,293	44,800*	19,040*	44,800*	58,875
1941	1,146,467	186,610	10,410	30,240*	67,200*	74,605
1942	304,413	74,324	12,444	28,000*	—	35,539
1943	38,656	74,904	437	7,840*	—	22,159
1944	109,949	36,450	160	—	—	7,204
1945	144,400	—	—	—	—	—

*Estimated.

From 1936 until 1941 the great bulk of rubber goods was made by machine methods which tended steadily to become automatic. Ingenious tire-building units reduced human effort to a minimum. Huge conveying hooks carried the unvulcanized tires to watchcase or dome-type vulcanizer units where they were cured in steam-heated moulds under pressure and were thence again carried on continuous conveyors to the warehouse. By 1940 virtually all tire-building steps were capable of being completely mechanized. The skilled workman of the former decades had gradually given way to machine and mass production methods.

With the need to supply rubber goods for war after 1939 came the return to hand-built articles such as fuel cells with their novel sealant plies, gas masks, tank tracks, delicate diaphragm discs, close-fitting sealing rings and the unending millions of parts for assembly lines in other war factories. Labour had to be trained to master skills which had been discarded. Even the mechanized assembly lines had to be either newly equipped or replaced to fit them for new types and sizes of product. By the end of the war in 1945 the shortage of labour had become more acute than that of critical materials like carbon black, tire cord and natural rubber. Reconversion steps after V-J day in Aug. 1945 were very rapid. The industry returned promptly and extensively to the mechanized type of operation and exceeded all estimates for fabrication of articles during 1946.

Natural Rubber.—The primary commodity for fabrication of rubber goods prior to 1943 was natural rubber, about 97% of which was grown on the estates and native gardens of the far east, in equatorial Malaya, Java, Sumatra, Borneo, Indo-China and Ceylon. After 1941, as has been noted, the Allies were forced to change from natural to synthetic rubber, and subsequent to 1943 the bulk of their rubber supplies had to be synthetic. Table III shows the amount of natural rubber consumed on the basis of tons per year and as a percentage of the total natural and synthetic rubber for the United States, which normally used about one-half the world rubber production.

Table III.—Natural Rubber Consumed in the U.S.

	Short tons	Percent of total (natural and synthetic)*
1937	609,000	100
1939	663,000	100
1941	868,000	100
1942	422,000	96
1943	356,000	65
1944	162,000	20
1945	118,000	15
1946 (est.)	295,000	29

*Excluding special purpose synthetic rubber.

A glance at Table IV serves to show the abrupt change in the source of rubber during ten eventful years, but it needs to be noted that the meaning of the term "rubber" had also changed. Rubber was now regarded as a state of matter rather than a specific material. Natural rubber is only one of the many polymers which can be made to serve the wide uses which make rubber important in commerce. It is not alone in its ability to confer cushioning with long flex life on wear-resistant structures like tires—an attribute which was now shared with several of the modern synthetic rubbers. Yet natural rubber at the end of the decade was better than other polymers in combining elasticity and rebound, extensibility, resistance to stiffening at low temperatures, good properties at elevated temperatures and low heat generation on flexing. A polymer identical with natural rubber had never been made in the laboratory.

Although natural rubber came mainly from the tropics, extensive trials were made to grow it elsewhere. In White Russia prior to the German invasion in 1941 the planting of more than 700,000 ac. of Russian dandelion (mainly *kok-saghyz*) was being planned to ensure the soviet republic a minimum of about 30,000 tons of rubber. In California during 1942 and 1943 nearly 30,000 ac. of guayule seedlings were planted. Experimental projects were also launched to grow *Cryptostegia* in the Caribbean region, to grow the Russian dandelion in the United States and to continue work on the recovery of rubber from goldenrod and other species of plants native to North America. All of these projects were handled by the U.S. department of agriculture. Rubber could be derived only at high cost from these sources, which were not competitive with tropical or with synthetic rubbers. Tropical America, once the origin of most of the rubber used in world trade, failed to step up production appreciably under the stress of World War II. Attempts such as those of Henry Ford in Brazil to bring large areas under cultivation and tapping did not succeed because of the blight called South American leaf disease. Inducements of a monetary nature to stimulate native tappers to bring in more wild rubbers were singularly ineffective at the time rubber was most needed, and the Rubber Development corporation, which had handled these functions during the war, indicated that success had been lacking in these efforts. Table IV shows the rubber produced in the western hemisphere each year from 1941 through 1944, and for comparison the production for 1910, when the price of rubber reached its peak, and for 1918, the last and least-productive year of World War I.

Table IV.—Western Hemisphere Production of Natural Rubber*
(short tons)

	1910	1918	1941	1942	1943	1944
Amazon countries	46,100	29,700	19,854	21,731	27,533	34,365
Mexico—guayule and other types	19,590	3,110	6,061	8,695	9,333	10,487
Central America	541	140	190	970	2,961	2,496
Other American countries .	4,170	3,220	2,350	4,235	4,169	4,904
Total	70,401	36,170	28,455	35,631	43,996	52,252

*Chiefly wild rubber.

Synthetic Rubber.—After World War I there was great activity in research on synthetic rubber. The Germans supported the lead of I. G. Farben researches which culminated in 1939 in the erection of the huge research laboratory in Leverkusen, a venture shared jointly by industry and the 3rd reich. The emulsion copolymers of butadiene-styrene, styled the lettered Bunas, were the net result of this joint effort. Buna S, the early German tire rubber, was a copolymer made from about 75 parts of butadiene and 25 parts of styrene charged into a stirred pressure vessel and allowed to react under specific conditions in the pres-

ence of water, an emulsifier and a catalyst. Buna S, designed for use in tires, was expected to replace natural rubber in general use. The Germans tried hard to make their synthetic polymer match the elusive properties of natural rubber but without marked success. In the midst of war they developed a series of polymers like Buna S, such as Buna S₁, S₃, S₄, for which claims of better properties and longer service life were made. These were but variations on the theme of emulsion copolymerization of butadiene and styrene. Buna SS, with a higher styrene ratio, was also made for electrical insulation, and for some uses where it lent itself to the more perfect forming of articles. Buna N, made by the same technique as Buna S, was designed with butadiene and acrylonitrile as the components of a copolymer with improved resistance to oil and to sunlight over the other Bunas and over natural rubber compositions. After 1937 it was exported under the name Perbunan and found ready acceptance in other countries. The name "Buna" was suggested by the work of earlier chemists who even prior to World War I had polymerized butadiene (Bu) by the use of sodium (Na). Reverting to the liquid or mass polymerization method of this early work, the German I. G. Farben chemists also produced the numbered Buna rubbers, such as Buna 85 and Buna 115, which they at one time found useful as softeners for the tougher lettered Bunas. The number referred to the number of thousands in one molecular weight unit. Thus, Buna 85 signified a polymer with 85,000 molecular weight.

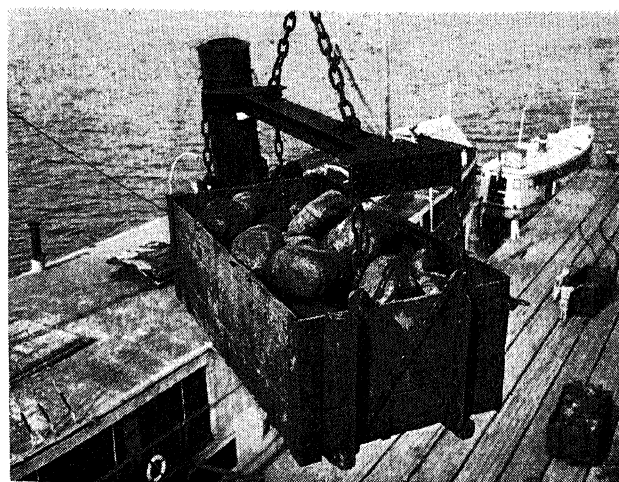
Production figures for synthetic rubbers in Germany revealed only slight bombing damage until fairly late in the war. The three large factories for the synthesis of the Bunas were located on the lower Rhine at Huels (in the postwar British zone of occupation), at Ludwigshaven on the upper

Table V.—German Production of Buna Rubbers
(short tons)

	Buna S	Buna N	Numbered Bunas
1939	22,400	1,260	788
1940	40,500	2,085	1,562
1941	71,400	2,900	2,153
1942	102,250	3,150	2,928
1943	121,000	3,970	3,878
1944	107,550	3,470	3,240

Rhine (French zone) and at Schkopau (soviet zone). Despite the destructive bombings of these three plants, the steel equipment in which the chemical synthesis was conducted came through little damaged. In large part it was available for operation after a brief period for refitting the

Unloading a shipment of raw rubber from a river boat at Mañaos, Brazil, in 1943. Brazilian wild rubber contributed to the stock pile of the United States and its allies during World War II



feed and delivery lines. In the main the large-jacketed reactors did not suffer damage, and by the early autumn of 1945 the fabrication of Buna rubbers was being resumed on a small scale.

Little was known about the synthesis of rubber in the soviet union, although the world was indebted to a Russian chemist, S. V. Lebedev, who was a pioneer in this field. During World War II the soviets made butadiene polymers, called SK rubbers, in two ways, both using alkali metal (presumably sodium) as a catalyst. In one case the liquid, in the other the vapour, butadiene was converted to a polymer. Just why both types were needed and whether one was superior to the other was not revealed. During the war the soviets were licensed by the E. I. du Pont de Nemours & Co. to make Neoprene, a polymer of chloroprene, although an earlier soviet version of this polymer, named Sovprene, had been reported. It was probably not inaccurate to infer from the meagre reports issued that the soviets preferred natural rubber to any type of synthetic, that their chemists had tried to make emulsion copolymers like Buna S, that alcohol was a favoured raw material for their operations and that the main product of synthesis was their "SK" polymers made from butadiene. After the war a few thousand pounds of soviet synthetic rubber were shipped to the United States for large-scale trials.

In the United States the earliest fabrication of synthetic rubber and of articles made from it was credited to R. B. Earle and L. P. Kyrides (Kyriakides) in 1910. These scientists, employed by the Hood Rubber company (later a division of the B. F. Goodrich company), Watertown, Mass., made polymers which they obtained from alcohol or acetone by expensive processes. The polymer thus made was used to make articles such as soles and heels, which were sold as finished products. After 1925 many new polymers with properties more or less like those of rubber were perfected by U.S. chemists. Some of these, such as the plasticized polyvinyl esters (Koroseal, Vinylite), were often listed as plastics, but their performance in uses once rendered only by vulcanized rubber entitled them to a position in the synthetic rubber field. Neoprene (1931), a polymer of monochlorobutadiene introduced by E. I. du Pont de Nemours & Co., earned a position among special-purpose rubbers with excellent properties in resistance to oil and sunlight. Thiokol (1928), a polyalkylene polysulphide, had a more limited range of usefulness with peculiarly favourable performance in certain lacquer solvents. Hycar (B. F. Goodrich company), Chemigum (Goodyear Tire and Rubber company), Perbunan (Standard Oil Development company) and Butaprene (Firestone Tire and Rubber company) were all nitrile-butadiene copolymers of the oil-resistant type which came into very active demand in solvent and oil-resistant structures, largely replacing natural rubber. Government rubbers—GR-I (butyl), mainly for inner tubes, GR-M (Neoprene) and GR-S, a general purpose copolymer of butadiene and styrene—were made in huge factories erected during World War II. Silicone rubbers, introduced by the General Electric company, had the ability to withstand high temperatures without loss of shape or insulating properties.

Few people in 1939, even after the invasion of Poland by Hitler's legions, gave serious thought to the threat of war against the world's supply of rubber. At the end of 1939 stocks of crude rubber in the United States had declined to 140,000 tons from more than 225,000 tons at the end of each of the years 1936, 1937 and 1938, and more than 340,000 tons at each year-end for the period 1931 through 1935. In order to build up domestic stocks, representatives of the U.S. industry and the Reconstruction Finance corporation recommended action by congress which resulted in the creation of the Rubber Reserve company on June 28, 1940. By virtue of a series of agreements with the International Rubber Regulation committee, stocks of rubber on hand by April 1942 had risen to 700,000 tons.

In June 1940 the B. F. Goodrich company brought out Ameripol tires with more than half of their rubber a U.S.-made synthetic polymer; and Standard Oil Development company announced butyl rubber, a product of U.S. origin. These announcements stimulated much public interest. The National Defense Advisory committee, starting in Aug. 1940, held meetings with representatives of industry which led to the engineering plans for a program of 112,000 tons of synthetic rubber a year. Since no private enterprise appeared willing to risk the capital to make this large operation possible, the plans and data were turned over to Reconstruction Finance corporation (*q.v.*) by the National Defense Advisory committee in Oct. 1940. These data comprised reports on the most satisfactory types of rubber for tires and tubes, the production processes to be used, the availability of the raw materials, the critical construction materials required for the plants and the time required to build them as well as the size and location of the plants. The Reconstruction Finance corporation sought answers to a complex maze of questions from the four major rubber companies and the Standard Oil Development company, all of whom were actively interested in synthetic rubber. It became apparent that huge sums of money were required, which the government was unwilling to approve. Consequently, the program was scaled down to less than half its original size, to 45,000 tons, which was authorized in May 1941. The contracts called for having 4 plants built, each with a total initial capacity of only about 11,000 tons, with no provision for raw materials with which to operate these plants before November. Meantime, privately financed plants had been expanded to a rated capacity of more than 30,000 tons by the end of the year. When Japan attacked Pearl Harbor, the government program for synthetic rubber proved totally inadequate. In Jan. 1942 this program was increased tenfold, and again doubled during the first half of 1942 after the fall of Singapore to a total of 900,000 tons, comprising 790,000 tons GR-S, 65,000 tons GR-I (butyl) and 45,000 tons GR-M (neoprene). With slight changes these programs when completed had a demonstrated capacity of 1,120,000 tons a year. Even after their authorization the public was not convinced that they could be completed in time to supply the needs of the Allies in a global war. Hence, on Aug. 6, 1942, the president appointed a Rubber Survey committee to study the rubber situation and make recommendations. This committee consisted of B. M. Baruch, chairman; J. B. Conant, president of Harvard university; K. T. Compton, president of Massachusetts Institute of Technology and a staff of other experts. After holding meetings and receiving reports the committee on Sept. 10, 1942, submitted to the president a report with specific recommendations concerning the rubber program, which called for the rationing of gasoline and

Table VI.—U.S. Production of Synthetic Rubbers
(short tons)

	GR-S	Nitrile copolymers	Neoprene	Butyl
1939	—	—	1,960*	—
1940	—	67*	2,800*	—
1941	254	2,760	6,375	—
1942	4,168	10,902	10,031	26
1943	204,130	16,225	37,635	1,538
1944	750,700	18,829	63,459	21,157
1945	805,732	8,816	51,153	53,117

*Estimated.

tires, for limiting speeds to 35 mi. per hour and for "bulling through" the gigantic synthetic program with the reorganization and consolidation of the government agencies then dealing with rubber. The creation of a new office under the War Production board, that of rubber director, was effected by the president's order in Sept. 1942. William Jeffers was appointed to that office, which he held until late 1943, when he was succeeded by Bradley Dewey.

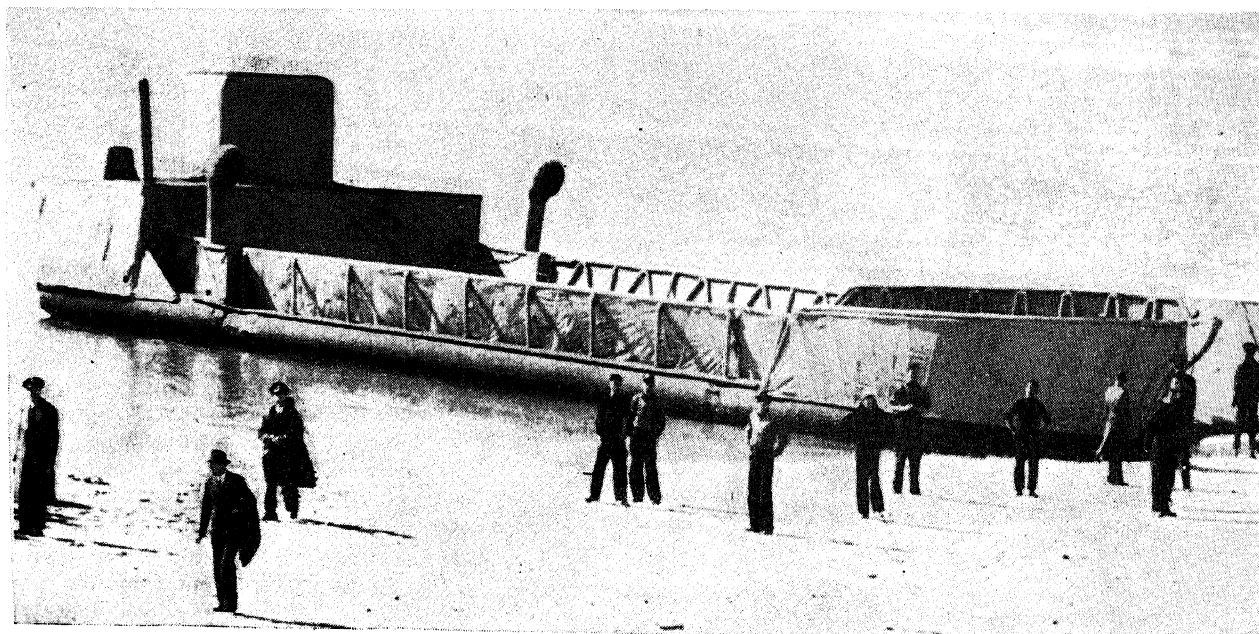
The synthetic rubber program required butadiene in amounts of 600,000 tons a year, 220,000 tons from alcohol and the rest from petroleum feed stocks, 187,500 tons of styrene, as well as smaller amounts of chemicals, catalysts and solvents. In addition to the plants for the starting materials, there were polymerization plants for GR-S, and plants of entirely different design for the manufacture of butyl and neoprene. There were 51 plants designed, built and placed in operation by 49 rubber, chemical, petroleum and industrial companies under the supervision of Rubber Reserve company. The estimated plant investment was in excess of \$700,000,000. In 1945 expenditures for materials, utilities, services, etc., were about \$2,000,000 a day. All of these operations involved full co-operation of the industry with pooling of patents, exchange of technical information and organization of research and development projects under contract with the government. These government-owned factories in the synthetic rubber program were distributed widely in order to make them accessible to raw materials or to the consumers of the finished product, with the heaviest concentration of facilities near the Gulf of Mexico. Plants were located in Connecticut, Pennsylvania, Ohio, West Virginia, Kentucky, Louisiana, Texas, Arkansas and California. The Canadian plant at Sarnia, Ont., under the supervision of the dominion government, had a designed yearly capacity of 33,600 tons of GR-S and 7,800 tons of butyl, with facilities for butadiene, styrene and isobutylene manufacture. It was announced in 1946 that this plant would continue to supply synthetic rubber

under government management and that excess production capacity beyond the needs of the dominion would supply polymers for world markets.

The ultimate disposition of the government synthetic rubber program in the United States had not been determined by Dec. 1946 although a preponderance of public opinion appeared to favour its sale to private industry. On Feb. 19, 1946, in the first report of the Inter-Agency Policy Committee on Rubber, Chairman W. L. Batt stated, "Private ownership and operation of the synthetic rubber industry should be a major objective." This report also made recommendations on the reserves of synthetic and natural rubbers to be maintained in line with the national interest. It specified that as a minimum there be maintained in production and use, regardless of cost, sufficient synthetic rubber capacity to supply one-third of the country's needs but not less than 280,000 tons per year. The plants maintained in production should "comprise the most efficient and low-cost of existing facilities." Exclusion of plants based upon alcohol was thus indicated. Such efficient plants as were in excess of the production minimum program and had not been acquired by private industry were to be maintained by the government in adequate stand-by condition for use only in a national rubber emergency. At least one of these stand-by plants was indicated for operation with alcohol feedstocks.

Textiles.—The need to combine rubber with supporting materials had been known from the start of the rubber industry. For years the leading textile material had been cotton cord, the strengthening element of tire carcasses. By 1940 rayon cord for truck tire carcasses had wide acceptance. Hence, it was necessary to set up facilities for its manufacture on an expanding scale to ensure that it would be in large supply to go with the synthetic rubber from the government plants. Rayon cord was specified because of its uniformity, good fatigue life, resistance to heat and flexure and ability to yield tires which would remain sound after several recapping operations. In the critical period of rubber shortage, the use of rayon gave tire designers the option to crowd more load-supporting cords per inch of width into combat and heavy-duty tires, thus conserving rubber and extending the factor of safety against blowout. The balance between GR-S plies, which grew hot faster than rubber under given speeds and loads, and the rayon plies,

Unit of a dummy fleet made of rubber and canvas, this L.C.T. was assembled and inflated on an English beach. It was revealed on Dec. 5, 1945, that entire armadas of invasion craft carrying dummy tanks, artillery and other equipment, were used along the English channel to confuse axis observers before D-day



which withstood heat better than cotton, made a dual change in design imperative. At one time during World War II 50 different projects to assure prompt supplies of tire-grade rayon were given the necessary priorities. In support of the military requirements, both William Jeffers, rubber director, and the Truman committee made clear the need for ample facilities for both rubber and rayon manufacture. By 1946 the capacity of rayon fabricators to produce yarns of tire grade (high tenacity) exceeded 200,000,000 lb. a year.

Table VII.—Passenger Car Tires and Truck-Bus Tires
(in thousands)

	Tire Production	Textile consumption (pounds)*	
		Cotton cord	Rayon cord
1937	53,310	232,769	...
1938	40,906	183,490	...
1939	57,613	264,727	...
1940	59,186	284,450	...
1941	61,540	303,249	16,996
1942	15,348	172,202	24,049
1943	20,423	171,578	28,667
1944	33,446	187,657	71,976
1945	44,524	189,879	124,656

*Source—Rubber Manufacturers association.
Total tire production was not available, except for 1944 and 1945, but since textile consumption was reported only for automotive casings (passenger car and truck-bus), this table gives the correct comparison.

By 1946 nearly half of all rayon produced in the United States was in the form of tire yarns, mainly in 1,100 denier size, and cotton cords had been largely replaced by rayon cords for truck and bus tires. In passenger car tires cotton cords continued to make up the bulk of the textiles employed, but to a limited extent rayon was being used. The war brought a noteworthy change in the fabrication of tire cords, a change from the assembly of cotton staple into yarns and cords by conventional cotton mill practice to the much-simplified doubling operations, starting with continuous filament rayon yarns on huge cylindrical beams.

The use of nylon yarns for special structures, like airplane tires and human parachutes, grew in importance during the war years largely because of the superior tensile strength, elongation and impact strength of nylon over other available materials. Thus, strong structures with great flexibility and economy in weight were successfully made for many strategic uses. Nylon, a product of synthesis from abundant materials like coal, was exceptional among filamentary forms of matter in showing little tendency toward brittleness and fatigue. Its properties thus bordered on those of rubber, and its combinations with the latter gave structures with unusual properties. Fortisan, another of the newer synthetics, made from cellulose acetate, was of comparable strength to nylon but much lower in its limit of elongation. In composition it resembled cotton or rayon.

Among the interesting textile materials for composite structures with rubber or with plastics was Fiberglas, a finely spun continuous filament of glass. With requirements for high strength, good electrical properties and ability to withstand temperature, Fiberglas was found superior to other textiles. Such composite structures often showed remarkable properties under impact.

Another supporting material which was used successfully in the construction of tire carcasses was steel wire. The Michelin company in France manufactured tires of this construction, and several large tire companies in the United States used wire where tires for moving heavy loads at low speeds, such as those for earth-moving equipment, were in demand.

Carbon Black.—Beginning about 1912, it was recognized that the life of tire treads against abrasive wear could be extended vastly by the incorporation of channel black with the rubber. Channel black is made by the incomplete burn-

ing of natural gas in small flames which impinge on metal surfaces to form coatings of soot. Tires made before World War II had carcasses of rubber which carried little or no carbon black, since its use in the inner plies favoured unwanted heat effects. With the advent of GR-S, it was necessary to use inner plies which carried generous amounts of carbon black to ensure the requisite strength and other physical properties of tire performance, and also to employ carbon black as usual in the outer tread to give resistance to wear. The resulting practice involved the consumption of 30-100% more carbon black per tire with synthetic than with natural rubber, but it also provided for the selection of varieties of carbon black which were quite different, for the carcass inner plies, from the channel black which was accepted as best for treads. Furnace blacks of two types had been perfected before World War II—the thermal decomposition types made by the simple application of high temperature to natural gas in a closed chamber, and the combustion types in which the gas and air were fed through a furnace where soot was liberated to the precipitator and collector system. The combustion types were usually intermediate between channel black and the thermal decomposition types in yield, in particle size and in reinforcing effects.

The demand for adequate supplies of black to go with GR-S forced an increase in facilities to make carbon black. Because of the smaller steel requirements, the higher yield obtainable from natural gas and the shorter time of construction, the War Production board specified furnace blacks. The productive capacity for this type of black began to exceed that for the impingement type, channel black. Attempts by a few suppliers to improve the quality of furnace blacks resulted in the production of "fine furnace" types or "structural blacks," one variety of which was made by burning oil.

The production of channel black was located in remote districts for good reasons. It contaminated the surroundings with air-borne soot, and most states restricted black production to "sour gas," not wanted in other commercial fields and not always purifiable for other uses. Most of the world's carbon black during the decade 1937-46 was made in Louisiana, Texas, Kansas, Oklahoma and California, subject to legislative restrictions varying somewhat from one state to another. As long as carbon black was made from waste gas, most states encouraged its manufacture to favour free enterprise and to secure taxable income. Natural gas was widely distributed in large gas mains to provide industrial and domestic fuel, and in most states gas which could be used in the mains was not permitted to go into carbon black. Methods were also discovered by which natural gas could be converted chemically to gasoline, a practice legally favoured ahead of black production. The producers of carbon black gradually increased the yield of product by more efficient methods but mainly as a result of the fact that the ratio of production of furnace blacks to channel blacks advanced yearly during the decade. Channel blacks conferring good tread wear are of extremely small average particle diameter (about 250 Angstrom units, 60-billionths of an inch), while the particles of furnace blacks have diameters from about 400 to 2,500 Angstrom units. The finer the particles required the lower is the yield. No way was found to gain high yields of a furnace black equalling the quality of the channel grades.

When channel blacks are dispersed in rubber the area of contact between the black and the rubber is extremely large, amounting to 11 ac. per pound of black or about 40

ac. for a tread of the most widely used passenger tire, size 6.00x16, which is about 12,000,000 times the usual area of tread rubber in contact with the road, 22 sq.in. Against the criticism of the waste involved in black manufacture attention was called to the fact that to make a set of tires run safely in the customary life of 20,000 mi., 75 cents worth of black from 35 cents worth of natural gas was required while the cost of the motor fuel involved in running the car would be about \$100.

Reclaimed Rubber.—Scrap rubber in the form of discarded tires, inner tubes, industrial belts, hose and footwear comprised the source of the great bulk of all reclaimed rubber during the decade 1937-46. The reclaiming process consisted of the removal from the scrap of metal, fabric or nonrubber components, either mechanically or chemically, followed by a treatment softening the vulcanized rubber and preparing it for incorporation with unvulcanized fresh rubber and other ingredients commonly used, such as sulphur, pigments and softeners. Normally reclaim was used as an aid in the processing of rubber and to stabilize the cost of ingredients rather than to cheapen rubber products. During World War II, besides the normal channels of consumption in such uses as industrial products and tire carcasses, reclaim was fortunately capable of being used largely to supplant rubber in tire-treading compositions. For several months during 1943 and 1944 in the neighbourhood of 30,000,000 lb. of camelback, unvulcanized rubber stocks of proper shape, for recaps and retreads were supplied by the industry each month in the United States alone, thus conserving the mileages latent in the carcasses of used tires and averting the need for new tires of rubber or of GR-S. This amount of camelback was enough for 2,500,000 passenger tires and 630,000 truck tires per month. A nation-wide scrap rubber collection, initiated by Rubber Reserve in 1942, received such generous response that no repetition was needed, although several shipments of scrap tires were made from England to the United States during the war years. The reclaiming industry was almost unique among the suppliers of necessary commodities to the rubber industry in not being involved at any time during the war in critical shortages. This excellent production record was cited by the rubber director late in 1943. The great benefit to the U.S. war effort from the use of reclaim came in the years 1942 and 1943, with lessening demands in 1944 as the huge output of GR-S was made available. Scrap tires based upon GR-S required a

quite different process of reclaiming as compared with those which prevailed with the scrap from natural rubber. Wherever Neoprene or other types of specialty synthetic rubber scrap were encountered, other and different methods of reclaiming were indicated. Timely reports of success in the use of reclaim from GR-S scrap and from mixtures of GR-S and natural rubber scrap appeared during 1946.

Other Raw Materials.—Both natural and synthetic rubber compositions need to be blended with sulphur, accelerators, age resisters, softeners and mineral ingredients to achieve mixtures which handle well and vulcanize to give the required properties. The underlying behaviour of the rubber hydrocarbon is the same whether natural or synthetic rubber is employed, and limited choices are possible in the selection of specific ingredients.

In general, compositions of GR-S require more softener and less sulphur than those of natural rubber. With both rubbers age resisters are consistently used to protect against deterioration of the product. Government plants for GR-S required age resisters, soaps (about 100,000,000 lb. a year) and incidental chemicals which were supplied by private industry. In the huge government program for GR-S the production of sulphur, accelerators, age resisters, softeners and emulsifying agents involved almost no investment of public funds.

Finished Products.—Tires and Inner Tubes.—The critical problem of the rubber industry in World War II was transportation. The Baruch report (Sept. 1942) stated:

Tires on civilian cars are wearing down at a rate eight times greater than they are being replaced. If this rate continues, by far the larger number of cars will be off the road next year and in 1944 there will be an all but complete collapse of the 27,000,000 passenger cars in America. . . . We find the existing situation to be so dangerous that unless corrective measures are taken immediately this country will face both a military and a civilian collapse.

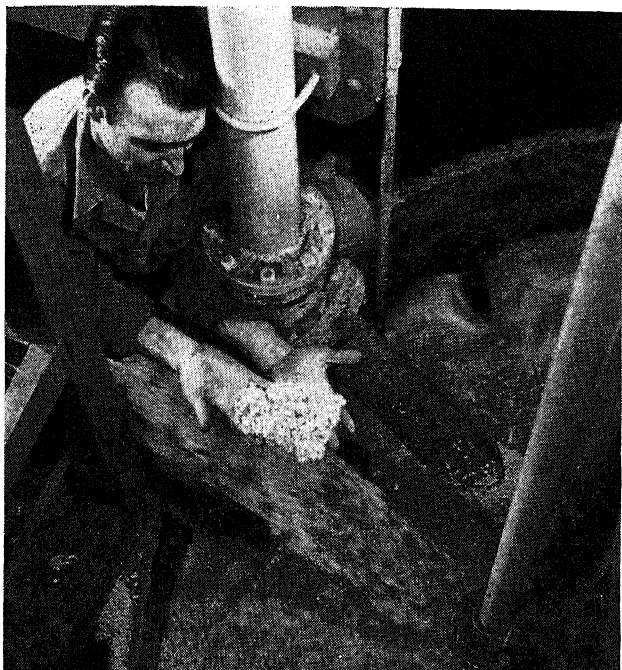
This report also summarized in tabular form the knowledge pertaining to the conversion of synthetic rubbers and reclaimed rubber into tires and recap material for tires, as shown in Table VIII.

Great credit was due to chemists and engineers of the rubber industry for their ingenuity in making tires from relatively unfamiliar materials. Sturdy constructions were arrived at by combining diverse novel elements, such as GR-S, rayon and certain carbon blacks. Adequate service tests were run promptly on these tires to ensure their satisfactory performance. All of these steps would have been a huge task under normal conditions, but with the threat of entire collapse of the Allies, time was of the essence.

Table VIII.—Comparison of Synthetic Rubbers and Reclaimed Rubber with Crude Rubber as a Tire and Recap Material*

	Manufacturing efficiency	Tread wear	Carcass failures	Suitability as a recap	For inner tubes
Buna S (new tires and recaps)	Good—Mixing 40–70% Building 80–100% Curing 100%	Good—Tests show about 90% mileage of crude rubber.	None—If 10% crude rubber is used.	Good—Tests show about 90% mileage of crude rubber. Curing time about the same as crude rubber.	Apparently satisfactory.
Neoprene (new tires and recaps)	Good—Mixing 40–65% Building 75–100% Curing 50%	Good—90% mileage of crude rubber at normal speeds; 125% under severe service.	None—No carcass failures reported in tires tested recently. Some failures in earlier tests.	Good—Tests show 90–110% mileage of crude rubber recaps. Curing time longer.	Apparently satisfactory.
Butyl (new tires)	Good—Mixing 100% Building 100% Curing 70–75%	Fair—40–50% of mileage of crude rubber.	Frequent—65% of first tires failed largely because of blisters which developed in the manufacturing process.	Promising—Adhesion with crude rubber was poor at first, but a recent development appears to have overcome this difficulty.	May be developed, but not yet satisfactory.
Flexon (new tires)			(Omitted)		
Thiokol (recaps)			(Omitted)		
Reclaim (new tires and recaps)	Good—Equal efficiency in milling, etc.; cures somewhat faster than natural rubber.	Poor—About 20–25% mileage of crude rubber.	Infrequent.	Good—Curing time same as for crude rubber.	Fairly satisfactory.

*Report of the Rubber Survey committee (Baruch, chairman), Sept. 10, 1942. Comparisons were based on average experience in latest tests, operating at speeds around 40 m.p.h. The mileage life of a crude rubber tire at this speed was considered to be about 35,000 mi.



A primary step in the manufacture of GR-S type synthetic rubber is the coagulation of synthetic rubber latex by salt and acid, which joins the small particles into larger crumbs. Here these crumbs are entering the soap-conversion tank from the coagulating tank in one of the co-polymer plants of the government rubber reserve company's California synthetic rubber project

Test fleets were maintained by the army, by the Office of Rubber Director (later by the Office of Rubber Reserve) and by numerous private companies in the industry. Information was pooled and cleared through committees, such as the Synthetic Tire committee of the War Production board, and then summarized and released to the industry. Rapid progress was made in the development of satisfactory combinations of the available materials.

By the end of 1944 both civilian and military authorities recognized that the transportation needs of the Allies were being supplied adequately. This achievement rivalled in importance the synthesis of the huge tonnages of rubber in the government plants. As an example of the improvement made in tires resulting from the intensive development program, the following facts had been published: In the 1943 hot weather tests, no group of GR-S truck tires ran more than 5,500 mi., although tires from 9 companies were represented. In a comparable test a year later the average performance (tires from 4 companies) was 10,000 mi., and one group averaged 22,000 mi. In the summer tests of 1945 on 9.90x20 truck tires, the average distance reached 20,000 mi. with a number of individual tires running as far as 35,000 mi. Reports from the Office of Rubber Reserve indicated that GR-S passenger tires in 1945 gave mileages about equal to those of prewar natural rubber tires.

In 1945 German tires were mounted on the government fleet at San Antonio, Tex. These gave less than 20% of the mileage of corresponding sizes of U.S. tires. Constructional details and poor quality of the components, such as rayon, appeared to be the cause of this difference in performance.

Inner tubes of butyl rubber were developed during World War II with air retention seven times that of prewar tubes. Butyl tubes also resisted the growth of tear in punctured regions better than those of natural rubber. It appeared certain in 1946 that there would be a steady demand for this type of rubber in tubes, even after large

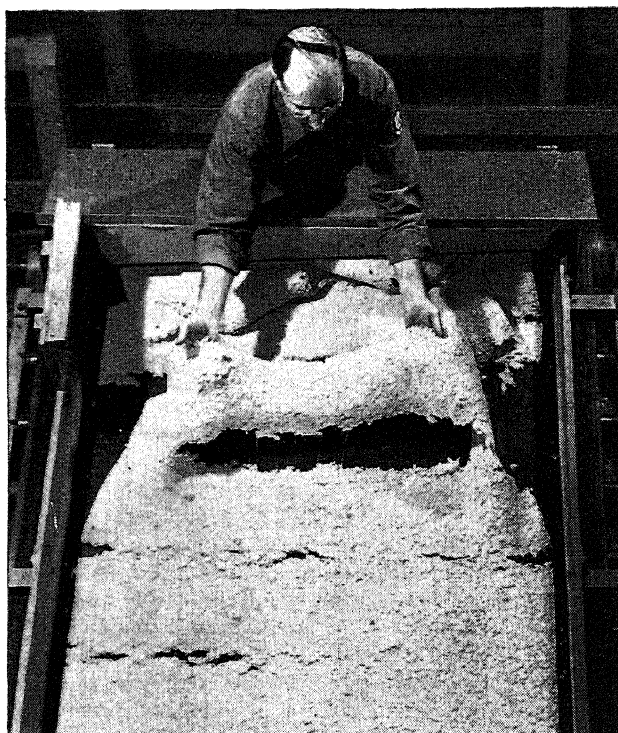
supplies of natural rubber became available.

One of the unusual constructions demanded by the military services was the heavy-duty combat tire operable under severe gunfire. Rubber was also designed to perform unusual services like that in the bogie wheels and endless band tracks of military vehicles. The services of supply made extremely heavy demands upon the transport rubber of all movable equipment. In extended operations such as the campaigns in North Africa, Italy and western Europe, as well as in the Pacific theatre, tires, tubes and repair materials were made promptly available in large quantities. These were, of course, mainly of synthetic rubber.

Industrial Products.—The demands of global war upon the world's industrial facilities were well known. Countless miles of rubber fire hose were needed in London, for example, during and after the blitz. Stepping up production meant huge quantities of belting, hose and gasket rubbers. Special compositions, preferably of synthetic rubber, were required wherever fuel or lubricants contacted rubber surfaces as in storage tanks, supply and dispensing hose, hose nozzles, etc. Fortunately, the attention of design engineers and rubber chemists had for a decade before 1940 been directed to the construction merits of Neoprene, the various nitrile rubbers, Thiokol and flexible vinyl plastics. In the stress of war hundreds of uses were found in which the newer synthetics alone could meet the requirements. One or more of the synthetic rubber compositions were found to be superior to those of natural rubber in various properties. These included degree of swelling by gasoline, aromatic solvents, mineral and vegetable oils, acids and water, permeability to gases, improvement in flame resistance and

When small particles of synthetic rubber latex have been coagulated into larger rubber crumbs, the next step in the production of GR-S type synthetic rubber is the filtering and washing of the crumbs. Here the rubber crumb is passing over the Oliver filter and through the pressing rollers, where excess water is removed





Filtered synthetic rubber crumb being conveyed to the disintegrator and drier. The crumb is passed back and forth three times on large continuous belts to evaporate the water in it

in electrical properties, better aging properties under exposure to sunlight, at elevated temperatures and upon storage at room temperature. Because of their superiority for particular uses, these novel synthetic rubbers made an assured market for themselves.

Latex.—Before the war Hevea latex from plantation sources was used in an expanding market. A considerable amount was used in treating tire cords, but large quantities were converted to sponge rubber for mattresses, cushions and arm rests, and to dipped goods of superior quality. By 1940 about 3% of the dry weight solids of rubber converted in the United States industry came from latex. The direct substitution of synthetic rubber latex for natural latex on this large scale proved impractical. Operations in many factories required concentrations of about 60% rubber solids, and a wet coagulum of high film strength with good cohesion, attributes not inherent in all latices of synthetic origin. Systematic trials showed how to make improvements in the various man-made latices used in increasing amounts by the industry to rival the prewar consumption of natural latex. Neoprene and other specialty polymers, like the new vinyl plastic Geon, were also marketed in latex form for expanding uses. Natural latex was thus faced with competition from products which did not exist before 1939. The elegance and cleanliness of processes based upon latex technology offered many advantages to makers of rubber goods.

Postwar Industry in Europe.—The rubber factories of England, France and Belgium suffered considerable damage during the war. Under the command of Gen. Dwight D. Eisenhower, however, operation of the French and Belgian units was resumed early in 1945 to supply tires, tubes and repair materials to the forces of the Allies. Reports from England indicated that despite severe destruction of some factories during the war, the year 1946 marked the resumption of manufacture on a nearly full-scale basis. Meagre reports from the Netherlands also indicated the

resumption of rubber manufacture. GR-S was exported to the European factories on a rather generous scale during 1946.

Trends in the Industry.—As noted above, the attempt to control world markets for natural rubber by the International Rubber Regulation committee, representing 97% of the producing areas, was abruptly terminated by the Japanese invasion of Malaya and the Netherlands Indies in 1942. Although the plan of economic controls had much to commend it, there was inherently an element of shortsightedness in it. Nevertheless, the accumulation of large inventories of rubber by the United States (1940–42) was probably favoured by the fact that there existed a well-integrated International Rubber Regulation committee with whom the Reconstruction Finance corporation, representing U.S. industry, could collaborate. At a later date in 1944, after the gigantic United States synthetic rubber industry had been set going, attempts to include United States representation on the International Rubber Regulation committee were not favoured by the state department. However, a rubber study group was set up, comprising representatives of the United States industry, the Reconstruction Finance corporation and the state department for the purpose of holding periodic discussions with the representatives of the rubber growers, viz., the International Rubber Regulation committee, to arrive at policies that would ensure an adequate supply of rubber in world markets. These discussions concerned the postwar competitive position of GR-S and natural rubber, which was not clarified even by 1946. It was clear, however, that the eventual costs of these two commodities would not be far apart. Costs of production for GR-S on an out-of-pocket basis were reported as low as 11–12 cents a pound, but the average costs had, of course, run much higher than this figure. The export pound price of 18½ cents, established in 1945, for GR-S was also the prevailing price to the

Synthetic rubber blocks, automatically weighed into 75-lb. lots and tested against 1,000 lb. of pressure, coming out of the baler



United States industry. Natural rubber delivered in United States ports was priced at 22½ cents a pound. The differential of four cents was estimated originally to represent roughly the difference in the costs of processing of the two rubbers. The quantities of natural rubber available during the first half of 1946 were smaller than had been anticipated. Political instability in Java and Sumatra, combined with the labour shortage (most severe in Malaya), was largely responsible for this shortage.

By midyear 1946, however, the supplies of natural rubber began to improve.

In the United States the government continued during 1946 as the sole source of rubber for general use by reason of its operation of factories for synthetic rubber, and government ownership of the stockpile of natural rubber. Rubber had for several years been a critical military necessity. Hence, its important place in the national economy made it a focal point of interest in the operation of numerous government agencies. These agencies and representatives of the industry met in Jan. 1946 to formulate a policy concerning the disposition of the government's synthetic rubber plants. Their report, mentioned above, recommended sale of the plants to the industry, the maintenance of a natural rubber stock pile and the continuance of research and development until the government terminated its operation of the synthetic rubber plants. The government had invested more than \$700,000,000 in plants for making butadiene, styrene and GR-S. It had also financed factories for producing rayon, carbon black and tires. This extensive participation by government in the rubber industry was without precedent, and its termination appeared to require the recommendation of the Batt committee, the action of the War Assets administration and the approval of congress. In July 1946 the government announced the sale of the GR-S polymer plant at Louisville, Ky., to the B. F. Goodrich company. This marked the first step in the return of synthetic rubber manufacture to private business.

In spite of the far-reaching changes incident to government participation in the rubber industry during World War II, involving rationing and standardization of product, every effort was made to avoid the imposition of unnecessary controls. Each manufacturer was permitted, as long as he met government specifications, to regulate the composition and construction of his product, provided his methods did not impair the service life of the product. For example, one tire factory used blends of natural and synthetic rubbers, whereas another factory used these components by themselves in individual plies. The integrity of competing units in the industry was recognized and conserved. The practice in Germany was, of course, quite different inasmuch as research, development and the formulation of policies were all formally centralized in a combination of facilities supported by both government and industry.

The reconversion of the rubber industry to civilian goods fabrication in 1946 proceeded much faster than had been estimated in late 1945, thus assuring adequate supplies of tires and tubes by the end of the year. This speedy resumption of normal civilian production by the United States industry was typical of the established pattern which had made the rubber companies noteworthy for their success in perfecting large-scale manufacturing operations. During the war much closer co-operation was required than before, so that competitors got to know each other's methods.

Before World War II, under competitive economy, the performance of tires was improved steadily, in some years

by as much as 10%. Meanwhile, the actual cost per tire mile was, in general, diminished. Rubber goods consumed by industry and agriculture were likewise showing improvements in quality and price stability. This trend on the part of the rubber industry was supported by active programs of research and development, which were not limited to those engaged in the manufacture of rubber products; growers of rubber also had invested extensively in research. Laboratories of the British at Kuala Lumpur in Malaya, and near London, of the Dutch at Buitenzorg, Java, and Delft in the Netherlands and of the French at Paris and at Saigon, French Indo-China, for example, were devoted to studies on natural rubber. Five important manufacturers of rubber in the United States either built or were building impressive new research laboratories in 1946. (See also CHEMISTRY; INDUSTRIAL RESEARCH; PETROLEUM.)

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Rubber, Synthetic

See CHEMISTRY; INDUSTRIAL RESEARCH; PLASTICS INDUSTRY; RUBBER.

Rubber Development Corporation, Rubber Reserve Company

See RECONSTRUCTION FINANCE CORPORATION.

Rubber Study Group

See INTERNATIONAL ORGANIZATIONS.

Rubies, Synthetic

See MINERALOGY.

Ruffini, Ernesto

Cardinal Ruffini, (1888–), Italian ecclesiastic, was born at Nantua, France. Ordained in 1910, he studied at Rome, becoming professor of sacred scripture at the Pontifical Propaganda university in 1913. He joined the Sacred Congregation of Seminaries and Universities, becoming secretary of the congregation in 1928. Working under the supervision of Pope Pius XI, he prepared the *Constitution Deus Scientiarum Dominus*, which inaugurated sweeping scholastic reforms in Catholic seminaries and universities. He also personally administered implementation of the constitution for Roman theological, canonical and scriptural universities.

He was named archbishop of Palermo in Oct. 1945 and was serving as prefect of the Sacred Congregation of the Affairs of Religious upon his appointment to the Sacred College of Cardinals in December of that year. He was created and proclaimed a cardinal at the Vatican consistory, Feb. 18, 1946.

828 Rugby

See FOOTBALL.

Rugs

See INTERIOR DECORATION.

Ruhr

See RHINELAND.

Rulers

For the names of all heads of state during the decade 1937-46, see articles on the individual nations concerned.

Rumania

After 1939 Rumania's frontiers underwent many changes. Bessarabia and northern Bukovina were lost to the soviet union; northern Transylvania to Hungary; southern Dobruja to Bulgaria. On Jan. 1, 1940, Rumania had an area of 113,919 sq.mi. and a population of 19,900,000. On Jan. 1, 1941, Rumania's territory comprised about 74,000 sq.mi. and its population was c. 16,000,000. In 1945 the territory of Transylvania was restored to Rumania. Capital, Bucharest (București). Principal cities: Bucharest (648,162); Jassy (Iasi) (104,471); Galatz (Galati) (102,232); Timișoara (89,872). Religion: mostly Greek Orthodox.

Into the Nazi Maelstrom.—By the opening of 1937, Rumania clearly was following the general central European trend toward authoritarianism and away from Western liberal democracy. The resignation of Nicholas Titulescu as foreign minister (Aug. 29, 1936) had inaugurated a period more sympathetic to Germany and Italy. Rumania, however, still held by the Little Entente and the League of Nations. Her relations with Poland, marked by many exchanges of visits, grew closer. In internal politics, an increasing agitation, directed mainly against Jews but also against the other national minorities, was conducted by the parties of the extreme Right, under the slogan "Rumania for the Rumanians." In Dec. 1937 general elections were held, and following them King Carol II entrusted the government to Octavian Goga, a well-known Transylvanian poet and the leader of the National Christians.

On Dec. 29, 1937, Goga formed a cabinet consisting of members of his own party, with four National Peasants, who were promptly expelled by their own party. Goga began his regime with various anti-Semitic measures on the nazi model, directed chiefly against Jewish doctors, journalists and innkeepers. He also dissolved parliament (which had not met), and ordered new elections for March 1938. King Carol, however, kept foreign policy "independent of domestic policy," and on the old lines of the treaties with France and Poland, the Little and Balkan Ententes, and the League of Nations. On Feb. 10, 1938, amid great economic confusion caused by the government's measures, the king dismissed Goga and appointed a provisional government with the Patriarch of Rumania, Miron Cristea, as premier, and six ex-premiers as ministers without portfolio. In a royal proclamation the king sharply blamed the party system, with which, he said, he had tried to work for eight years. Martial law and censorship were proclaimed, and a series of edicts forbade all state, municipal, etc., employees and all priests to have any contact with politics; dissolved all political parties and associations; and forbade marching in formation, singing political songs, etc. On Feb. 20, 1938, King Carol issued a new constitution, which reduced the number of senators and deputies, raised the life of the chambers from four years to six, offered fuller representa-

tion to peasants, workers, etc., and provided for reform of the civil service. Voting was to be compulsory, suffrage commencing at 30 years (both sexes). Long-established minorities were guaranteed equal rights, and religious toleration was promised.

An open plebiscite on Feb. 24, 1938, resulted in 4,297,851 votes in favour of this constitution and only 5,483 against it; it was promulgated on Feb. 27. On March 30 the cabinet was reconstructed, the ex-premiers and other notabilities being transferred to a council of state. A ministry of national economy and a national economic council were appointed. The National Peasant party protested sharply against the king's *coup*; under the leadership of Julius Maniu it acted as the true and most popular representation of the democratic forces in the country. On the other hand, the authorities in April arrested Corneliu Codreanu, leader of the fascist Iron Guard, renamed the "All for the Fatherland" (*Totul pentru tara*), and nearly 1,000 of his followers who, it was said, were seizing the occasion offered by Germany's occupation of Austria to plot a revolt. On May 27 Codreanu was sentenced to ten years' imprisonment for plotting against the social order, preparation for rebellion, instigation to murder and treasonable relations with foreign powers. Lighter sentences were passed on many of his followers. Later in the year Codreanu and 13 other Iron Guard leaders were shot and killed by their prison guards who maintained that an effort was under way to rescue the terrorists. Members of the party throughout the country were arrested. The anti-Semitic tendency became less pronounced, but Jews resident in the new territories of Rumania on and after Dec. 1, 1918, were required to prove their citizenship, many failing to do so. On Aug. 12 a new statute was issued, abolishing the old historic divisions of Rumania and dividing the country into ten new provinces, grouped round the main rivers. On Dec. 16 a royal decree announced the establishment of a single legal political party, the "National Renaissance Front."

In the Czechoslovak crisis of 1938 Rumania had fully lived up to her international obligations and stood faithfully with her Czechoslovak ally; she consulted with the U.S.S.R., and was believed to have consented to the dispatch of military material from that country to Czechoslovakia. The direct railway line across the northern Carpathians was rapidly expanded. In Oct. 1938, Rumania resisted Poland's endeavours to persuade her to favour the cession of Czechoslovakia's Carpatho-Ukraine to Hungary. Relations with Hungary became severely strained at the time of the new Czech crisis of March 1939, when the Rumanian government refused to participate in the dismemberment of its former ally. But, through the dissolution of Czechoslovakia, Germany had become almost Rumania's neighbour. Troops were called up and remained on the frontier during the summer. By a trade agreement concluded on March 23, 1939 Germany was promised a large share in developing Rumania's mines, forestry, oil wells, etc. and undertook to supply arms and munitions extensively. But subsequent trade agreements with France (March 31) and Britain (May 11) somewhat restored the balance. The British and French guarantees to Rumania (April 11) were received "with satisfaction" by the Rumanian government, at the head of which was Armand Calinescu, who had become prime minister on March 7 following the death of Patriarch Cristea, with Grigore Gafencu as foreign minister.

On Sept. 6, 1939, following the invasion of Poland, Rumania decided to maintain strict neutrality, although the German, and the subsequent soviet advance, which

wiped out of existence her chief ally, made her position very difficult. She showed an increasing tendency to lean on Turkey, with whose help she hoped to weld the Balkans into a "neutral bloc"; but although her neighbours likewise proclaimed neutrality and disclaimed aggressive intentions, both Hungary and Bulgaria were unwilling to join any bloc, instead reviving, ever more openly, their claims on Transylvania and Dobruja respectively. In face of these demands, Rumania declared repeatedly that she would make no territorial concessions.

Prime Minister Calinescu was assassinated in Bucharest on Sept. 21 by a member of the Iron Guard. After some confused changes of cabinet, George Tatarescu, the former liberal leader, formed a new cabinet on Nov. 24 which seemed less remote from the old party alignments, although Gafencu continued as foreign minister. Tatarescu's first task was to give a sharp reply, defending the justice of Rumania's frontiers, to the strong comments which Count Csáky had made in his speech on Hungarian foreign policy on Nov. 21. Relations with Bulgaria remained little more satisfactory, and uneasiness was caused by an article in the *Communist International* of Moscow suggesting that the U.S.S.R. proposed to turn its attention to Rumania when it had finished with Finland. These threats came true in 1940.

At the final opening of parliament on March 7, 1940, King Carol in his speech from the throne stressed Rumania's will to maintain a strict neutrality. But the king was soon forced to proclaim an amnesty for many of the Iron Guard leaders, while the successor of Codreanu, Horia Sima, returned from exile in Germany and resumed the leadership of the party. Prime Minister Tatarescu expressed the hope that, in view of the external danger threatening the existence of the state and the national heritage, all parties would unite in a common defense of the fatherland. This hope proved to be in vain. The fascist party continued its destructive work, and with increased German pressure and the mounting tide of German successes on the western front, Foreign Minister Gafencu resigned on June 1 and was replaced by Ion Gigurtu, an adherent of a pro-axis orientation. On June 27, 1940, the soviet union occupied the provinces of Bessarabia and northern Bukovina, with about 4,000,000 inhabitants and containing Rumania's second and third largest cities, Chisinău or Kishinev with 112,000 and Cernăuți or Czernowitz with 110,000 inhabitants. Rumania was unable to defend her territory against this act of aggression, Germany having apparently acquiesced in the expansion of her then ally Russia. With the complete defeat of France in June 1940, the king was faced by an entirely new balance of power and renounced the British-French guarantee of 1939. The German air force occupied the country under the pretext of protecting the oil fields against a British attack. On July 4, 1940, Ion Gigurtu became prime minister and Horia Sima, the leader of the Iron Guard, became minister of education and "enlightenment." British engineers and oil experts were ordered to leave the country immediately; the largest oil company was taken over by the Rumanian government, which established a monopoly over the exploitation of the oil fields and the export of the oil.

Negotiations with Hungary about Transylvania lasted for several weeks and created much bitterness between the two countries. Budapest claimed the largest part of Transylvania, which until 1918 had formed part of Hungary but was predominantly inhabited by Rumanians and was regarded by them as the most progressive and nationally conscious part. Finally the German and Italian govern-

ments decided the dispute in a way which satisfied Hungary, but left the Rumanian population bitterly hostile. The award of Vienna (Aug. 30, 1940) ceded northern Transylvania with 2,370,000 inhabitants to Hungary.

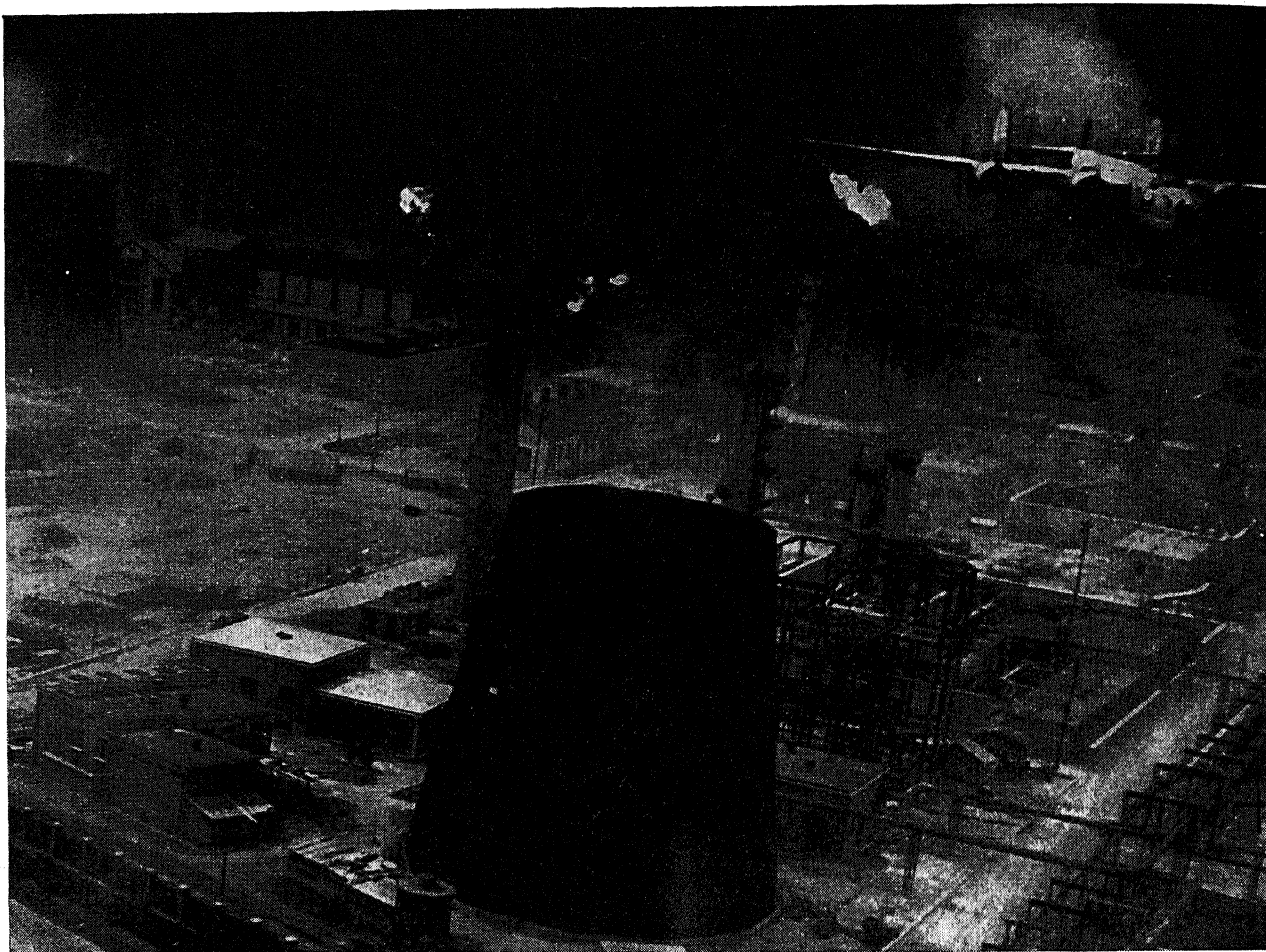
Less antagonism was caused by the cession of southern Dobruja to Bulgaria, in the treaty of Craiova on Sept. 7, 1940. This quadrilateral plain between the lower Danube and the Black sea had formed part of Bulgaria until 1913 and was inhabited by a Bulgarian majority. In view of the dismemberment of Rumania, Germany guaranteed the frontiers of the state as they emerged after the three territorial cessions. Under this pretext German troops occupied the country.

The Antonescu Regime.—The ensuing unrest and the violent dissatisfaction which the cession of northern Transylvania provoked forced the king to name General Ion Antonescu, a man who leaned upon the Iron Guard for the establishment of his government, as dictator. This move did not, however, ensure orderly administration. King Carol was forced to abdicate on Sept. 6, 1940, and left the country. His son and successor was king only in name; the real power passed into the hands of Antonescu and the Iron Guard, which proceeded to avenge the execution of its former leaders. A large number of prominent Rumanian statesmen, former ministers, generals and high police officers were arrested. An earthquake on Nov. 10, which caused considerable damage though the exact extent was withheld from the public by censorship, aggravated the situation. On Nov. 23 Rumania signed its official adhesion to the Berlin-Rome-Tokyo pact in Vienna. On Nov. 27 the Iron Guard started a week of massacre and terrorization throughout the country. Sixty-four of the arrested dignitaries were executed over the graves of Codreanu and 13 other Iron Guard leaders, who were exhumed and buried a few days later with the greatest pomp.

Relations between Gen. Antonescu and the Iron Guard, however, soon became hostile. By the end of Jan. 1941 a serious fascist revolt broke out under the leadership of some foremost members of the government itself, among them Vice Premier Horia Sima. Ion Codreanu, father of

Territorial changes provided for in the Rumanian peace treaty as recommended to the Council of Foreign Ministers by delegates to the Paris peace conference on Oct. 11, 1946





The Ploesti oil refineries in Rumania were subjected to a concentrated air assault by U.S. Liberator bombers flying at low altitudes on Aug. 1, 1943, severely damaging the principal source of Germany's fuel

the slain Corneliu, also played a prominent part. The minister of the Interior, Gen. Constantin Petrovicescu, likewise was involved; he had been replaced immediately before the outbreak by the military commander of Bucharest, Gen. Demeter Popescu.

The Antonescu dictatorship was accused by the Iron Guard, which embraced most of Rumania's youth, younger officers and many priests, of having sold out the country to the Germans. The fighting between the heavily armed Iron Guardists and government troops lasted for several days. It was accompanied by ferocious pogroms against the Jews, of whom many hundreds were killed. After three days of fighting, Bucharest was again in the hands of the government, but rebel units held out for a short while at Brasov, Ploesti, Arad and Constanta.

While Horia Sima succeeded in escaping, Antonescu, with the help of the Germans, threatened the insurgents with death and tightened his grip on the country. Antonescu formed a new government consisting mainly of high ranking army officers and close personal friends, and announced his intention to develop a closer community of spirit between the axis and Rumania. On Feb. 10, 1941, Great Britain severed diplomatic relations with Rumania in view of the occupation of the country by large German forces; at the beginning of March these forces crossed the Danube into Bulgaria, and on April 6 attacked Yugoslavia and Greece. On March 12 Premier Antonescu held a nation-wide plebiscite. All persons over 21, except Jews, were obliged to vote, no opposition was allowed, and the vote was to be one of approval or disapproval of Antonescu's conduct. Needless to say, an almost unanimous vote of approval was cast. On March 5 Antonescu had seen

Chancellor Hitler and had given Germany full control over Rumania's economic life and foreign policy. Meanwhile the Rumanians complained of the shortage of food in their rich agricultural country as a result of German operations, and the feeling of the people was reported to be so strongly anti-German that there were definite rumours of dissatisfaction on the part of the Germans with Antonescu's regime. Much of the Rumanian dissatisfaction could also be explained by the continued tension with Germany's other friend, Hungary, over Transylvania, whose loss had never been accepted by the Rumanians. How seriously Rumania had been hit by the "new order" could be seen in the fact that while the country had exported, in the first three months of 1940, 412,600 tons of cereals, the exports had sunk in the same period of 1941 to 96,900 tons. In June 1941, a monster trial against the leading Iron Guardists brought heavy punishment to some of the former best known rightist statesmen of Rumania.

War on Russia.—All internal problems, however, receded into the background for a while when Rumania entered the war against the soviet union on the side of Germany (June 22, 1941) to reconquer the provinces ceded to the soviet union in 1940. By the middle of July the formerly Rumanian parts of Bukovina and Bessarabia had been reconquered. But the Rumanian army did not halt at the old frontiers. It had to bear the brunt of the war against the soviet union in southwestern Ukraine, across the Dniester river, and in the siege of Odessa; and

the losses of the Rumanian army were so great that the discontent, silenced for a short while by the military successes, grew again and assumed alarming proportions. The war effort strained the disrupted Rumanian economy so much that war weariness became general and a demand for an end of military operations was heard even in high army circles. Persecution of the Jews in Rumania reached a new height. The territory lying between the Dniester and the Bug rivers, outside the former boundaries of Rumania, was put under Rumanian administration as Transnistria, with the capital in Tiraspol. Antonescu was named marshal on Aug. 23, 1941, in recognition of the Rumanian conquests.

In Sept. 1941 the chief of staff of the Rumanian army, Gen. Mihai Jonescu, was killed on the eastern front. The administrator for Bessarabia and Transnistria, George Alexianu, had to promise radical agrarian reforms to appease the angry peasantry of the newly conquered or reconquered territories. A new plebiscite in Rumania was held on Nov. 9 in which again every citizen had to vote on Rumania's foreign and home policies and had to declare before the vote whether he was going to vote yes or no—whereupon he was handed the corresponding ticket. The German news agency declared beforehand that no one in Rumania doubted that the plebiscite would be an overwhelming demonstration of confidence in Antonescu and his work. But Rumania, in spite of victories and conquests, offered by the end of 1941 a picture of discontent and disorganization. The picture was not brightened by Rumania's declaration of war against the U.S. in Dec. 1941.

In spite of the iron rule of the dictatorship, opposition was strong within Rumania, from two different sources. One was the extremist Rumanian youth, the supporters of the Iron Guard; the other was the democratic peasant party led by Julius Maniu, who insisted upon regaining northern Transylvania and upon a "western orientation" as against Antonescu's expansion eastward. Throughout 1942 many arrests were made. Among those arrested and sentenced were on the one hand young students, on the other hand personalities of high Rumanian society, among them Eugene Titeanu, former minister of propaganda, Radu Lobei, secretary of the former premier Armand Calinescu, and George Deoharl, former deputy mayor of Bucharest. The unrest in the country was increased by the great rise in prices. From Aug. 1939 to Jan. 1942 the increase averaged 300%, and even the domestic foodstuffs rose about 200%. In spite of the great initial military successes, the war grew less and less popular after the hardships of the winter of 1942 and the very heavy sacrifices to which the Rumanian troops were exposed before Stalingrad and in the Caucasus. The war demanded an ever increasing participation of the Rumanian army, much against the expectations of leading Rumanian circles responsible for Rumania's subservience to the axis, and it was believed that the German army command was using Rumanian troops at specially dangerous positions. The vigorous Russian counteroffensive and the British successes in North Africa in the last two months of 1942 increased the feeling of apprehension. In June 1942 the United States struck at Rumania by air for the first time when a small number of Liberator bombers raided the oil fields of Ploesti.

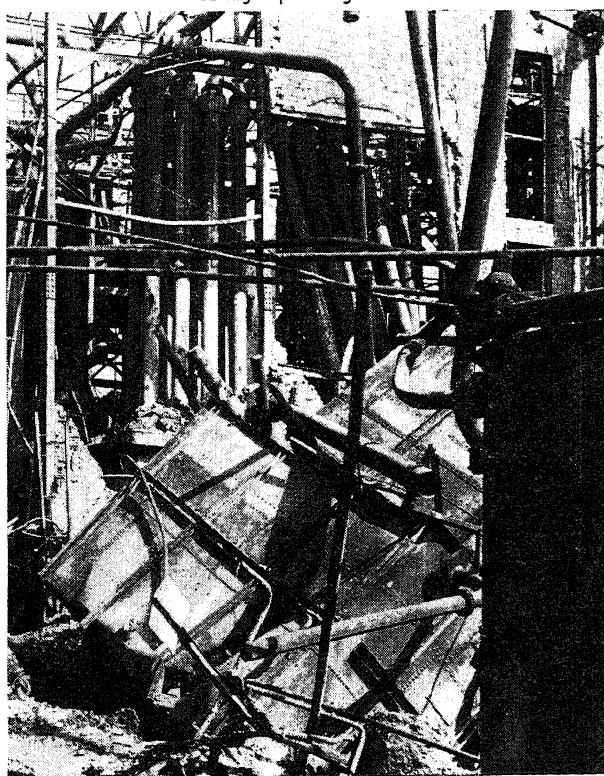
The most important issue of Rumanian foreign policy continued to be her relations with Hungary over Transylvania. Julius Maniu and Constantin Bratianu, leader of the old liberals, signed a memorandum to Marshal Antonescu on Jan. 28, 1942, in which they demanded renewed efforts for the re-incorporation of Transylvania. On Feb.

22 Maniu sent another letter to Vice Premier Mihai Antonescu, and the text of the letter was also made public by leaflets. As a result Mihai Antonescu delivered on March 19 an address in the crowded assembly hall of the Bucharest law faculty where among the cheers and shouts of "give us back Transylvania!" he called northern Transylvania "the cradle of our fatherland" which was subject to a "regime of oppression, humiliation and discrimination." The Rumanian vice premier, who was also acting foreign minister, rejected Hungary's claims of dominating the Danubian basin. Rumania tried a rapprochement with Slovakia and Croatia to check Hungary's aspirations. Only with greatest difficulty did Germany succeed in maintaining the "truce" between Rumania and Hungary, pointing out that a final decision could be taken only after a successful conclusion of World War II.

Disintegration.—In the two following years Rumania's history continued its stormy course. The fast Russian advance through southern Russia in the spring of 1944 brought not only Transnistria again under Russian control, but carried the Russian army and Russian administration back to Bessarabia and northern Bukovina. When the Russian troops crossed the Rumanian border into what they recognized as Rumanian territory, they pledged their intention to respect Rumanian sovereignty, not to interfere with Rumanian internal affairs and social order and not to covet any Rumanian territory.

With the Russian army at the gates of Rumania, Premier Ion Antonescu and Vice Premier Mihai Antonescu tried to make contact with U.S. and British representatives in Turkey and Egypt. The Rumanian will to peace was prompted by continued Allied bombings of Bucharest and of the Ploesti oil fields. By the middle of July 1944 Marshal

Twisted wreckage at a modern cracking unit of the Steua Romana refinery outside Ploesti, largest oil centre in Europe. The Rumanian oil fields and refineries were targets for repeated Allied bombings during April-August 1944



Antonescu realized that Germany was losing the war, and he was reported ready to resign. The German minister to Rumania, Baron Manfred von Killinger, notified Horia Sima, leader of the extremist fascist Iron Guard who had taken refuge in Germany, to be prepared to take over the government. But this threat and all German pressure remained ineffectual; the desire to save Bucharest from destruction by the advancing Russians and the general hatred of the Rumanian armies for Horia Sima prompted a *coup d'état* by King Mihai, who in the night of Aug. 23-24, 1944, arrested Antonescu and his cabinet with the help of loyal generals. The Germans, infuriated by the "betrayal," subjected Bucharest to a heavy air raid. King Mihai ordered his army to cease fire against the forces of the United Nations and declared his willingness to accept unconditional surrender in the name of the nation. He called on the nation immediately to take up the fight by the side of the soviet forces on Rumanian soil against their common enemy, Germany.

The king appointed a military government under Marshal Constantin Sănătescu, consisting of five generals, one admiral and two civilians as ministers with portfolio and representatives of the four big parties as ministers without portfolio. The Germans tried to establish a Rumanian puppet government, but the Russian and Rumanian armies, acting in collaboration under soviet command, soon cleared German troops from the country and reconquered northern Transylvania from Hungary. On Aug. 31 the Russians paraded down the broad Calea Victoriei, Bucharest's main thoroughfare. Baron von Killinger committed suicide. The leader of the Rumanian Communist party, Lucretiu Patrascanu, had secretly met with the king before the *coup d'état* and deliberated with him about its perpetration. The Communists in Rumania supported officially the monarchy and its governments.

The armistice was signed in Moscow on Sept. 12, 1944. Rumania promised to supply at least 12 infantry divisions for the war against Hungary and Germany, to intern enemy civilians, to ensure free Russian troop movements, to repatriate Allied war prisoners, to hand over all German military equipment found in Rumania and to control all enemy alien property. In addition Rumania promised to pay reparations for damages caused to Russia by military operations and occupation. In view of Rumania's help in the war against Germany, Russia declared itself satisfied with the payment of \$300,000,000, to be paid over a period of six years in oil products, grain, timber, ships and various machine equipment. The Rumanian government pledged to return intact all material removed from Russian territory and to restore the lawful rights and interests of the citizens of all Allied nations on Rumanian territory. The Rumanians also promised to disband all fascist organizations and to put all publications, production of plays and films, radio, post, telegraph and telephone under the supervision of the soviet high command. While Rumania renounced definitely Bessarabia and northern Bukovina, the Allies considered the partition of Transylvania as nonexistent and agreed that Transylvania, or at least its major part, should be returned to Rumania.

In the domestic field the Rumanian parties were far from any definite agreement. The most important parties were the National Peasant party under Maniu, the Liberal party under Dinu Brătianu, the Socialist party under Constantin Petrescu and the Communist party under Patrascanu. As these parties could not unite on a com-

promise program, the government continued to be in the hands of the king and his generals, though the second Sănătescu cabinet included mostly civilians. The Russians acted at the beginning very cautiously and did not openly interfere. The jockeying of parties lasted until the beginning of Dec. 1944, when a new Rumanian cabinet was formed, with Gen. Nicolai Rădescu as prime minister and minister of the interior.

General Rădescu had been a staunch adversary of the Germans and of the war against Russia. The national Democratic Front, under the nominal leadership of the vice premier, Peter Groza, but in reality under Communist control, found itself, however, in disagreement with Rădescu. Large scale demonstrations, organized by the Communist party, were held. The hands of the king were forced by the arrival in Bucharest of the Russian vice commissar of foreign affairs, Andrei Vishinsky, who on March 3, 1945, prevailed upon the king to dismiss Rădescu and to appoint a new cabinet under Peter Groza. Rădescu, fearing for his personal safety, took refuge in the British legation.

Groza's Puppet Government.—The new government represented officially a coalition. The prime minister, Peter Groza, was the founder and leader of the Plowman's Front which had split off from the National Democratic Peasant party. Vice premier and minister of foreign affairs was George Tatarescu, formerly an anti-soviet and anti-semitic prime minister (1933-1937) and later a henchman of ex-king Carol II during his attempts at a royal dictatorship. The key ministries were in the hands of Communists: the ministry of the interior commanding the *siguranza*, the dreaded secret police, under Theodor Georgescu; the ministry of justice under Lucretiu Patrascanu; and the ministry of propaganda and press under Petru Constantin. The greatest influence was exercised by Anna Pauker, a veteran woman communist leader. The two most important parties, the National Democratic Peasant and the (conservative) Liberal, were not represented in the government. Much of the communist propaganda was directed against Maniu, the Peasant leader, who was denounced as a "reactionary," and against the western democracies.

Groza's government was strengthened by the restoration of Transylvania, settled by Russia without awaiting the peace conference or any consultation with the Allies. In Transylvania Hungarian inhabitants received wide minority rights. Measures in favour of the poorer peasantry were undertaken as part of a land reform program. Nevertheless, Rumania was faced with a breakdown in its agriculture and with near famine conditions, in spite of its normally great agricultural production. Rumania's industries, especially its important oil wells, were incorporated into the Russian economy.

The growing dissatisfaction in the country, with the absence of democratic liberties and with the existing regime, led King Mihai to appeal in Aug. 1945 to the United States, Russia and Great Britain for the democratization of the regime. But Groza refused to resign. His visit to Moscow the following month strengthened his position. At the beginning of Nov. 1945 popular demonstrations on the king's birthday were suppressed. The Liberal party protested against the abrogation of civil liberties. Even the Social Democrats, who formed part of the coalition, threatened opposition. Their two cabinet members, Labour Minister Lotar Radăceanu and Education Minister Stefan Voitec, supported the Communist demand for the formation of a single worker's party. The overwhelming majority of the Social Democrats and their leader Con-

stantin Titel Petrescu, rejected such a close collaboration and decided to maintain their identity.

The Big Three conference at the end of 1945 in Moscow decided to send representatives of the three powers to Rumania to settle the political crisis by broadening the government through inclusion of democratic elements and by restoring liberty of the press and preparing free elections. The mission was hardly successful. On Jan. 7, 1946, Emil Hatieganu, rector of Cluj university, entered the cabinet as the representative of the National Peasant party, and Mihai Romniceanu as representative of the Liberal

party. Groza promised officially that "the government undertakes to hold free elections as soon as possible, to respect the rights and liberties of citizens, to guarantee freedom of the press, of opinion, of religion, and of assembly, and to guarantee the king's constitutional rights." However, these promises were not honoured. The decisive position of the minister of the interior remained in the hands of Teohari Georgescu, a Communist leader, while the opposition had demanded that the key minis-

tries of the interior and justice be given to nonparty men who would assure freedom from intimidation. Russia objected to any international supervision of elections, thus removing the only guarantee for their relative fairness. Newspapers which expressed views critical of the government were not necessarily suppressed by the government but by the typographical workers who, under order of the Communist unions, refused to print oppositional newspapers and exercised their own censorship over their editorial content. Distribution of the available newspaper by the government was also a factor in "regulating" press and public opinion according to the wishes of the government. Nor was free circulation of "independent" papers assured.

On the basis of the official pledges by the Rumanian government to hold free elections and assure liberty of the press, of speech and assembly, the governments of the United States and Great Britain announced their recognition of the Rumanian government on Feb. 6, 1946. On Feb. 8 the first number of the newspaper of the Liberal party, *Liberalul*, was allowed to be published; but in a signed editorial the liberal leader Constantin Bratianu protested against the fact that in spite of the pledges taken by the government, "public liberties are not yet restored. Journalists receive even now directives as under the regimes of terror, . . . there is not allowed to be read any but extreme leftwing newspapers."

Rumania: Statistical Data*

Item	1938		1941		1944	
	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number	Value (000's omitted)	Amount or Number
Exchange rate						
United States		1 Leu-0.73c		1 Leu-0.69†		†
Great Britain		650 to 670 Leu-£1				
Finance						
Government revenues . . .	\$202,178		\$282,741		\$1,479,691	
	(£41,354)		(£70,124)		(£366,714)	
Government expenditures . .	\$195,158		\$250,546		\$1,151,872	
	(£39,918)		(£62,139)		(£283,470)	
Gold reserves	\$133,242		...		\$26,806½	
	(£27,253)				(£6,643)	
National Debt	\$822,356		...		\$6,184½	
	(£168,205)				(£1,534)	
Transportation						
Railroads		6,980 mi.		5,550 mi.‡		5,716 mi.
Highways		65,670 mi.		...		...
Navigable waterways . . .		2,094 mi.		...		...
Airways . . . . .		...		...		1,716 mi.§
Communication						
Telephones		93,314		...		99,000
Telegraph lines		12,679 mi.		11,155 mi.¶		24,126 mi.¶
Radio sets		274,314		245,716		289,774
Minerals						
Petroleum		7,268,844 tons		9,019,213 tons		16,934,960 tons
Coal		2,640,602 tons		2,709,936 tons		3,207,229 tons
Natural gas (consumption) . .		55,070,211,000 cu. ft.		42,846,402,000 cu. ft.		50,849,786,000 cu. ft.δ
Gold and silver ore		776,665 tons		514,914 tons		447,118 tons
Crops						
Corn		5,640,800 tons		...		1,210,906 tons||
Wheat		5,314,519 tons		...		1,174,530 tons||
Potatoes		1,834,668 tons		...		...
Vines		1,618,838 tons		...		...
Barley		917,224 tons		...		294,675 tons||
Livestock						
Sheep		12,767,510		...		6,581,506§
Cattle		4,161,056		...		3,077,207
Swine		3,164,571		...		1,335,752
Horses		2,158,266		...		827,667
Manufactures						
Total	\$505,209	...	\$574,863□	...	\$1,123,030¶	...
	(£103,336)		(£150,094)		(£278,322)	
Food	\$113,715	...	\$117,320□	...	\$345,028¶	...
	(£23,259)		(£30,632)		(£85,509)	
Textile	\$109,251	...	\$127,699□	...	\$244,338¶	...
	(£22,348)		(£33,344)		(£60,555)	
Chemical	\$96,329	...	\$120,861□	...	\$5,002¶	...
	(£19,746)		(£31,556)		(£1,240)	
Metallurgical	\$82,947	...	\$104,898□	...	\$205,739¶	...
	(£17,379)		(£27,409)		(£50,989)	
Exports—Total	\$157,726	8,167,000 tons	\$284,876	5,313,748 tons	\$490,814	4,027,709 tons
	(£32,261)		(£70,654)		(£121,639)	
Petroleum	\$68,218	4,956,000 tons	\$221,871	4,394,826 tons	\$323,883	3,502,548 tons
	(£13,953)		(£55,028)		(£80,268)	
Cereals & cereal products . .	\$38,515	1,526,000 tons	\$33,122	305,007 tons	\$50,934	133,929 tons
	(£7,878)		(£8,213)		(£12,623)	
Wood & wood products . . .	\$18,056	1,066,000 tons	\$6,708	161,607 tons	\$3,347	39,903 tons
	(£3,693)		(£1,661)		(£829)	
Live animals	\$8,944	65,000 tons	\$907	2,645 tons	\$29,116	29,431 tons
	(£1,829)		(£225)		(£7,216)	
Imports—Total	\$137,474	905,000 tons	\$210,975	431,969 tons	\$620,914	927,937 tons
	(£28,119)		(£52,328)		(£153,882)	
Iron & manufactures	\$29,740	423,000 tons	\$36,835	117,163 tons	\$84,920	412,911 tons
	(£6,083)		(£9,136)		(£21,046)	
Machinery, apparatus and motors	\$26,062	46,000 tons	\$24,490	21,737 tons	\$85,161	51,645 tons
	(£5,331)		(£6,074)		(£21,106)	
Vegetable fibre and products	\$20,862	54,000 tons	\$27,076	17,494 tons	\$74,788	17,394 tons
	(£4,267)		(£6,715)		(£28,287)	
Metal and metal products . .	\$10,812	22,000 tons	\$56,718	36,972 tons	\$208,322	49,493 tons
	(£2,211)		(£14,067)		(£51,629)	
Defense						
Standing army personnel . .		161,559				
Reserves		1,616,000				
Standing navy personnel . .		3,250				
Standing air force personnel		12,000				
Military expenditures . . .	\$70,378					
	(£14,395)					
Education						
Elementary schools		17,068				
Students		2,491,243				
Secondary schools		935				
Students		200,525				
Universities		6				
Registered students		30,771				

*Statistics cover territories under Rumanian control at time respective figures were taken.

†No rate after 1940; values for 1941 through 1944 computed on 1940 value of leu; 1945 on February 1947 value; 16,000 leu equal \$1.00.

‡Based on value of 1 ounce of gold.

§1945.

¶1942.

□Includes telephone lines.

δ1943.

||1940.

The two representatives of the non-Moscow controlled opposition parties who had been elected to the cabinet in January, were ministers of state without portfolio, spending their time protesting against interference and terrorism directed against their parties. The Social Democrats were brought under Communist control and decided to vote for a single combined Socialist-Communist ticket in the approaching election, thus saving the Communists from a certain defeat at the hands of the electorate. The leaders of the opposition parties charged officially on April 15, 1946, "flagrant breaches with respect to the liberties granted by the Moscow agreement. The clear intention not to co-operate with the opposition is evident by the continual attacks on opposition parties and leaders."

American and British oil companies in Rumania owning about 25% of Rumania's oil expressed fear of the almost complete loss of their invested capital through the forced production and sale of oil at a price far below the production cost. The oil was sold to Russia in fulfillment of armistice obligations. Large quantities of irreplaceable equipment were claimed by the Russians as war booty. Through a network of jointly owned "Sovrom" companies, Russia gained control of all major Rumanian economic and transportation enterprises. Russia enjoyed practically a monopoly in the Rumanian market.

On May 17, 1946, Marshal Antonescu was sentenced to death after a 12-day trial. Twelve other persons were convicted with him, including Mihai Antonescu, the former vice premier, Gen. Constantin Vasiliu, former deputy minister of the interior, and George Alexianu, former governor of Transnistria. They were all executed on June 1, except for Eugene Cristescu, former chief of the Rumanian secret service, Radu Lecca, former commissioner for Jewish affairs, and Gen. Constantin Pantazi, former war minister, whose sentences were commuted to life imprisonment upon the recommendations of the government. (See also FASCISM; WORLD WAR II.)

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Rumanian Literature

See CENTRAL EUROPEAN AND BALKAN LITERATURE.

Runciman of Doxford, 1st Viscount

Viscount Runciman (Walter Runciman) (1870–), British statesman, was born Nov. 19, 1870, at South Shields, England, the eldest son of the first Baron Runciman. Walter Runciman was educated at Cambridge and entered parliament in 1899. He was named president of the board of trade, 1914, but retired from the government in 1916 after a disagreement with David Lloyd George. Runciman, who was not in parliament from 1918 to 1924, was elected in the latter year as M.P. for Swansea West. In 1931 he joined the Liberal-National party and from November of that year until May 1937 (when he was made a viscount), he was again president of the board of trade.

Prime Minister Neville Chamberlain sent Runciman to Prague, Czechoslovakia, in July 1938 to "mediate" the Czechoslovak-Sudeten dispute. Following conferences with leaders of both sides he urged Pres. Eduard Benes to yield to Hitler's Sudeten demands; he recommended im-

mediate cession of the disputed Sudeten areas to Germany, pressed Prague to forbid all anti-German agitation, abolish its alliances with foreign powers and accept guarantees from the major European powers against unprovoked aggression. In Nov. 1938 he was made lord president of the council, a post he held until Sept. 1939. Thereafter he devoted his energies to his many and varied business interests.

Rundstedt, Karl Rudolf Gerd von

Rundstedt (1875–), German army officer, was born Dec. 12, 1875, at Aschersleben, Germany. During World War I he served with German armies in Alsace and Poland. He acquired fame as one of the better German strategists for his operations in the Polish campaign (1939) and in France (1940). He was created a marshal of the reich by Hitler on July 19, 1940. Rundstedt took part in the invasion of the soviet union, inflicted a crushing defeat on Marshal Simeon Budenny in the northern Ukraine but was defeated in turn by Semyon Timoshenko at Rostov in Nov. 1941.

Transferred to France, Rundstedt was made military ruler of all France by Hitler in Nov. 1942. Because of his failure to halt the Allied landings in Normandy, June 1944, he was removed as supreme commander of the wehrmacht on the western front, but was restored to this post in September. Rundstedt's major achievement on that front was the surprise attack against Gen. Dwight D. Eisenhower's forces in the celebrated Ardennes battle in Dec. 1944. Although his armies lacked the force to sustain the operation, it was generally conceded that the attack was brilliantly planned. (Subsequent reports said Hitler had planned and ordered the attack on the Ardennes.) In March 1945 information received by the Allies indicated that Rundstedt had been replaced by Marshal Albert Kesselring.

Rundstedt was captured May 1 by U.S. troops. Testimony given at the Nuernberg trial by Col. Gen. Alfred Jodl, June 5, 1946, said Rundstedt had urged Hitler to sue for peace in July 1944 because the situation of the wehrmacht in France was then hopeless.

Running

See TRACK AND FIELD SPORTS.

Rural Electrification

During the decade 1937–46, more than 2,000,000 of the 6,000,000 farms in the United States received central-station electric service for the first time, and the percentage of electrified farms in the country spurted from less than 15% to more than 52% of the total. By the end of 1946, every U.S. farmer could look forward to the prospect of highline electric service that would bring him the comforts of town and city living and the production methods of modern industry.

In 1935, the stage had been set for great expansion of rural electrification by the launching of a federal program to promote rural electrification. The Rural Electrification administration was established by presidential executive order after congress had included funds for rural electrification in the Emergency Relief Appropriations act of 1935. The agency was given statutory life under the Rural Electrification act of 1936, which originally established a ten-year program; the time limitation was removed by congressional action in 1944.

Under the stimulus of the federal program, methods of power line construction particularly suited to rural areas were developed for the first time in the United States.

Low-cost line-building techniques reduced rural power line construction costs from approximately \$2,000 a mile to less than \$1,000 a mile.

The REA program also stimulated co-operative operation of rural electric systems. The co-operative method of doing business on a nonprofit basis had been so successful in many fields of farmer interest that preference for nonprofit and limited-profit groups as borrowers of REA loan funds was specified in the Rural Electrification act. By 1946 more than 95% of all REA funds had been lent to rural electric co-operatives organized under state laws by rural people who lacked electric service. These co-operatives were controlled and managed by the power consumers they served. Retail rates were based on cost, with allowance for repayment of the government loan.

The full impact of this program began to be felt in 1937. Figures indicated that at the beginning of that year slightly more than 1,000,000 farms had central-station electric service. The subsequent growth of rural electrification, as indicated by the increase in number of electrified farms and in percentage of total U.S. farms electrified, was as follows: 1938, 1,300,000, 19.1%; 1940, 1,870,000, 27.1%; 1941, 2,126,000, 34.1%; 1942, 2,337,000, 38.3%; 1943, 2,454,000, 40.3%; 1944, 2,573,000, 42.2%; 1945, 2,726,000, 44.7%; 1946, 3,107,000, 52.9% (official estimates for June 30 of each year; percentages based upon the 1935, 1940 and 1945 census reports).

Of the 2,100,000 farms electrified between Jan. 1, 1937, and June 30, 1946, about 1,200,000 received service through facilities financed by federal loans. At the end of the 1946 fiscal year, the Rural Electrification administration had allocated more than \$817,000,000 in loan funds to 996 borrowers, of which 918 were co-operatives, 38 were public power districts, 20 were other public bodies and 20 were private utilities, a few of which had borrowed federal funds in the early years of the program. At the close of the 1946 fiscal year, 856 borrowers had in operation about 475,000 mi. of line serving more than 1,549,000 consumers in all states except Connecticut and Rhode Island and in the territories of Alaska and the Virgin Islands. Approximately 80% of the consumers were farms; the rest consisted of nonfarm residences, industrial and commercial enterprises and community institutions in rural areas. Through the end of fiscal 1946, the REA borrowers had paid nearly \$115,000,000 of principal and interest on their loans, of which almost \$20,000,000 represented payments on principal in advance of due dates. In contrast, only \$898,000 owed the government by REA borrowers was overdue 30 days or more.

The example of the REA-financed groups in the rural field stimulated the nation's commercial power companies to a new approach to rural electrification. The utilities began to seek farm customers and, in many cases, to offer them electric service on the terms that had always been available only to city and town customers. By 1946 high connection charges and expensive long-term power contracts for farmers had largely disappeared from the power business. Statistics compiled by the Edison Electric Institute, trade association of the commercial power companies, indicated that as of June 30, 1946, the commercial power companies were serving about 1,900,000 farms, in contrast to a total of only 750,000 farms served on Dec. 31, 1934, shortly before the REA program began. Approximately 900,000 of the utility-served farms were electrified between 1937 and 1946.

Progress in rural electrification was retarded during World War II by restrictions placed on the use of critical materials for new line construction. For a part of the war

period, no power line construction was possible. Later, in recognition of the importance of electrical equipment in producing for war, War Production board regulations were modified so that electric service could be extended to qualified farms for use in war food production and in alleviating rural labour shortages. Although many farmers received electric service under this provision, the rate of farm consumer connections for the nation fell off to about 125,000 a year, less than half the rate that had been maintained from the beginning of 1937 until mid-1942.

This slack construction period provided an opportunity for one of the major rural electrification developments of the decade—the preparation of plans for extending electric service into unelectrified rural communities on an area coverage basis.

With nearly 3,000,000 U.S. farms and an equal number of other rural establishments remaining unelectrified in 1946, rural electric co-operatives in many states had completed plans for bringing service to substantially every unserved farm and other rural residence and establishment in their areas. To facilitate this program, congress in 1944 liberalized the terms of loans made by the Rural Electrification administration. Under the original act, repayment was required over a maximum period of 25 years, with interest ranging from about 2½% to about 2¾%. The 1944 amendment reduced the interest rate to a flat 2% and increased the maximum amortization period to 35 years.

The ability of the rural electric co-operatives to carry out area-wide electrification was also aided by a gradual reduction in wholesale power rates, since the cost of wholesale energy was the largest single item of expense of most co-operatives. Reports of the Rural Electrification administration showed that the average cost of wholesale energy purchased by REA borrowers dropped from 12.1 mills per kw.hr. in 1939 to 8.2 mills in 1945. In large part this drop was the result of an increase in the percentage of total power purchases obtained from publicly-owned power facilities and a decrease in the percentage obtained from commercial suppliers. In 1945, the borrowers paid an average of only 6.6 mills per kw.hr. for power purchased from publicly-owned suppliers, contrasted with 10.1 mills per kw.hr. for power purchased from commercial companies. The authority of the Rural Electrification administration to finance generating facilities, although seldom exercised, had considerable effect in reducing wholesale rates in some areas where no public power facilities existed.

In many sections of the country, rural electric co-operatives and power companies appeared to work amicably side by side, each electrifying farms nearest to its existing lines. In other sections, there were conflicts, stemming chiefly from the co-operatives' insistence on the area coverage approach to rural electrification. Some power companies attempted to "skim the cream," or serve only more populous rural sections that co-operatives had included in their plans and needed to serve in order to carry out area-wide electrification. Many such disputes were brought before state control bodies and even the courts during the decade, with varying results. Some of the leaders of the utility industry proposed that competing co-operatives and utilities serving contiguous territories enter into agreement as to the farms each would electrify, but the Rural Electrification administration refused to approve such agreements on the ground that no farmer could be denied the right to receive electric service under the federal program.

Differences between the federally and privately financed

rural electrification programs were aired in congress in 1945, when several spokesmen for the utility industry appeared in opposition to a bill that would have established a three-year postwar program for the Rural Electrification administration. They took the position that the work of the rural electric co-operatives was essentially finished and that rural electrification should and would be completed in the United States by the commercial power companies. After prolonged hearings, the much-amended bill died in committee, but congress responded to insistent farmer demand for electric service by authorizing REA to lend a total of \$550,000,000 in fiscal 1946 and fiscal 1947—more than had been lent in the previous 10 years of the federal rural electrification program. Loans from this fund, the Rural Electrification administration announced, would enable the rural electric co-operatives to add more than 1,000,000 new consumers to their lines as soon as materials could be obtained. The Edison Electric institute reported in 1945 that its member companies had made plans to electrify 600,000 farms by the end of 1948 if materials became available.

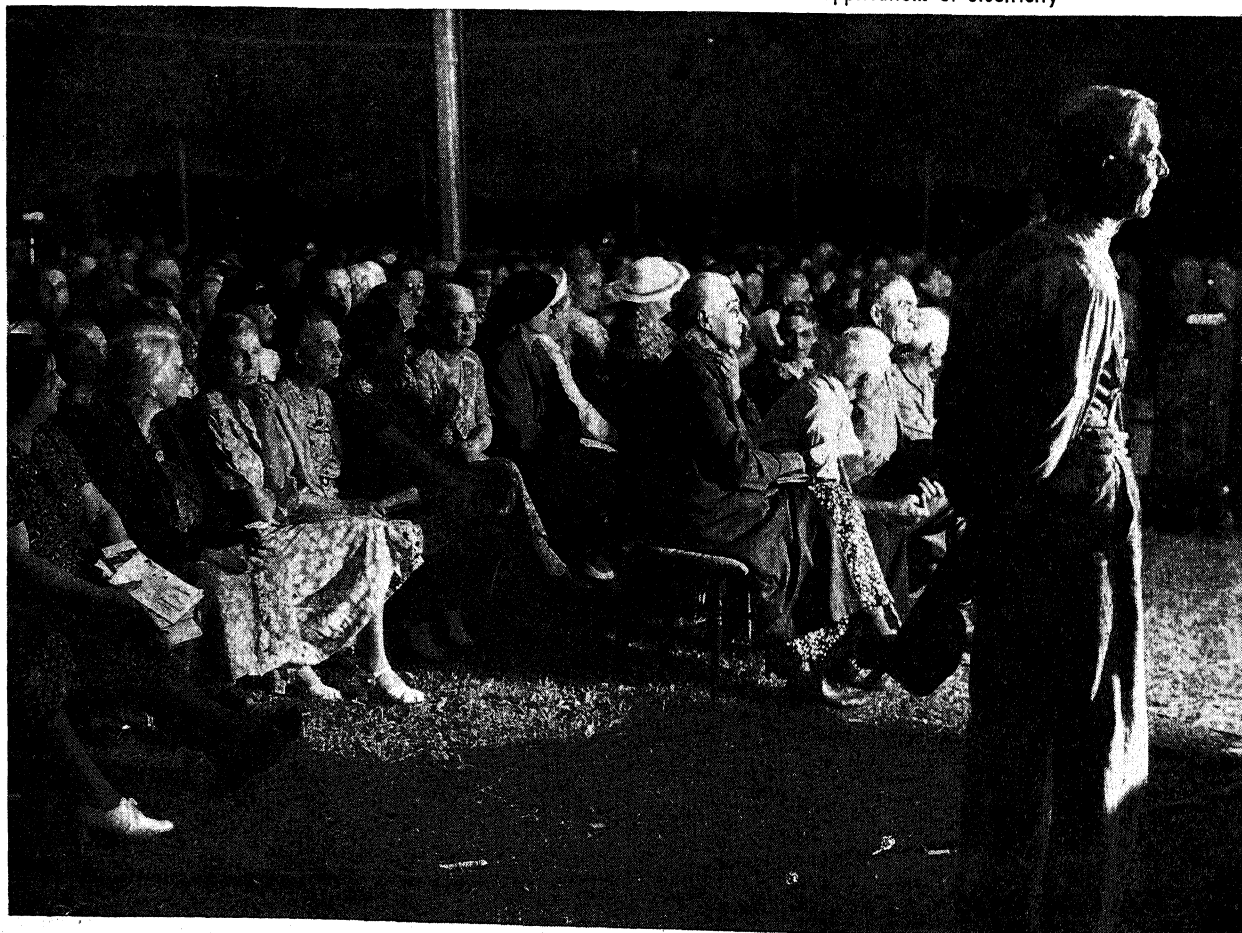
A substantial start on the postwar rural electrification job was made during the 1946 fiscal year. Although line construction materials were almost as scarce as during the war, agencies that had made area coverage plans were able to add new consumers through short extensions to existing lines with minimum use of materials. During the year ending June 30, 1946, rural electric co-operatives extended service to approximately 230,000 new rural consumers—more than in any other year except fiscal 1941. Of this number, about 185,000 were farms. Private companies re-

ported adding approximately 195,000 farms to their lines during the same period. Thus, an estimated total of 380,000 U.S. farms were electrified in fiscal 1946—the largest annual number to that date.

Development of new electrical equipment designed specifically for farm production use became a major activity of many government agencies, agricultural colleges, research institutions and manufacturing establishments during the years between 1937 and 1946. Many a farmer who was content with electric lights and a radio on his electrified farm in 1937 was using, ten years later, a pressure water system, electric refrigeration, electric fences, electric milking machines and milk coolers and an electrically-powered blower to dry his hay in the barn. He could look forward to using electrical home-heating equipment and a variety of other electrical devices still to come. The total value of major electrical equipment in use on the nation's farms in 1943 was estimated at approximately \$600,000,000, nearly two-thirds of which was represented by household appliances. The department of agriculture inter-bureau committee on postwar planning reported in 1944 that electrical farm production equipment would be in greater demand after World War II than ever before. The committee estimated that more than \$4,500,000,000 would be spent by rural consumers during the first 5 postwar years for wiring, plumbing and farm and household electrical equipment.

The increased use of electricity in rural areas after consumers had become acquainted with its many benefits was shown by statistics compiled by the Rural Electrification

The "Farm Equipment Show" staged by the Rural Electrification administration in 1940, toured rural areas of the U.S., where several hundred thousand persons saw demonstrations of labour-saving applications of electricity



administration. In 1945, for instance, it was reported that on REA-financed systems under 3 years old, the average monthly residential consumption was 59 kw.hr., while on systems more than 6 years old the monthly consumption per residential consumer was 97 kw.hr. In some states, average consumption by all REA-served consumers amounted to more than 100 kw.hr. in 1945. One rural electric co-operative in the state of Washington reported an average power consumption by its membership of nearly 250 kw.hr. per consumer per month. REA borrowers distributed nearly 2,200,000,000 kw.hr. of energy during the 1946 fiscal year, an all-time high. This was four times the amount of energy distributed over REA-financed facilities in fiscal 1941, although the number of consumers served only doubled between 1941 and 1946.

During the decade, too, use of electricity in rural industries and in the improvement of rural community facilities increased greatly. More agricultural commodities were processed and needed manufactured articles were produced in small rural sections manned by local labour. Improved schools, churches and health facilities made possible by electric service virtually transformed many rural communities.

So greatly did the rural use of power grow that shortage of power for rural areas became a major concern of groups interested in rural electrification. In 1946, the Rural Electrification administration reported that fewer than half of the energized REA-financed systems were able to supply all the power needed by their consumers. It recommended redesigning of co-operative rural power systems to meet ultimate needs and called upon the power industry for boldness in planning to provide adequate power for rural areas.

Among the scores of technical developments in rural electrification during the decade, one of the most promising was the proposed use of rural power systems for telephone communication. Experimental work in this direction was begun in the early 1940s by the Bell system, the Rural Electrification administration and several interested power companies. The program was suspended during the war, but several trial installations were made in 1945. Two methods of communication were proposed. In one, power wires would actually be used for telephone communication through the use of carrier currents. In the other, telephone and power lines would be strung on the same poles.

(C. R. Wd.)

Great Britain.—In 1936 the national grid of the Central Electricity board had been completed, assuring efficiency in the generation of electricity. In the same year the McGowan committee issued a report on distribution and made recommendations for its reorganization. The government had not in 1946 been able to introduce legislation for this reorganization, but nevertheless considerable progress had been made in rural electrification (which was not state-subsidized in Great Britain) by the supply industry. Some 40,000 mi. of supply lines, constituting the main rural network, had been constructed. Full rural development was envisaged in the postwar period, and the Central Electricity board in 1946 planned an expenditure of £200,000,000 during the following three years for the extension of generating plant.

Between 65% and 70% of the 1,220,000 rural premises, housing some 20% of the total population, had an electricity supply, while the number of connected farms had risen from about 25,000 in 1937 to some 78,000 in 1946, the latter figure representing 27% of the agricultural holdings in England and Wales of 5 ac. and above. The whole of Great Britain was covered by authorized elec-

tricity undertakings, and almost all villages with a population exceeding 250 had electricity. The extension of rural supplies was assisted by the adjustment of the electricity commissioners' regulations, by the introduction of a standard rural overhead line of cheap construction recommended by the Electrical Research association, and in some districts by the use of single-phase supply instead of three-phase.

Superseding the comparative indifference of farmers toward electrification in 1937, there was in 1946 an insistent demand for an electricity supply, stimulated by labour difficulties and increasing costs which made increased mechanization necessary, and by greater agricultural prosperity. Joint liaison committees were set up by agricultural organizations with the Electrical Development association and the Incorporated Association of Electrical Power Companies. In Sept. 1946 it was announced that agreement had been reached between the National Farmers' Union of England and Wales, the Scottish National Farmers' union and the Chamber of Agriculture and electricity supply companies on a 5-year plan to spend £72,000,000 on bringing electricity to 150,000 holdings.

The Hydro-Electric Development (Scotland) act, 1943, established the North of Scotland Hydro-Electric board to provide supplies of electricity to the north and west of Scotland—about two-thirds of the area of that country, having a density of population of only 42 per sq.mi.—not covered by the national grid scheme. This board had already prepared a number of hydroelectric schemes which had been authorized by the electricity commissioners. Constructional work on some had been started. The whole program might cost £100,000,000, and was to provide an estimated total of 300,000,000 units per annum for general use as well as power for the electrochemical and electrometallurgical industries which it was hoped would be established in the area.

In Northern Ireland, substantial progress in rural electrification was made by the Electricity board for Northern Ireland.

Europe.—In France, by 1946, more than 97% of the total of 36,000 rural villages had a supply, and more than 98% of the premises in these villages were connected, although the average annual consumption was 200 kw.hr., which was much smaller than in Great Britain. This degree of electrification had been made possible by substantial government subsidies and state-aided schemes, by loans at low rates of interest to agricultural co-operative societies, by the use of light and cheap overhead lines and by the fact that the electricity supply regulations were less rigorous than in the United Kingdom. Wartime difficulties in obtaining alternative sources of power led to the extensive use of electricity for threshing and for plowing and cultivation in both large-scale farming and market gardening. The other applications of electricity in rural France were very similar to those in Great Britain. Small portable motors were in common use on French farms.

Before World War II, some 80% of German farms were supplied with electricity. During the war, oil engines driving farm machines were replaced by electric motors on a wide scale, and there was in 1946 a relatively greater number of small motors in use for agricultural purposes than in most other countries. Electricity was used for threshing, crop treatment and crop conveying, milking and dairy sterilizing, animal food preparation, water supply and irrigation. Rural electricity distribution was undertaken in some districts by co-operative societies.

The rural districts in Belgium were very widely electrified, but the farms being small, they were not fully equipped with electrical apparatus. In the Netherlands, more than 90% of the rural population had electricity available. In the bulb-growing and market-gardening districts, electric soil warming was used extensively, and some important research had been carried out on the effect of artificial illumination upon plant growth.

Denmark and Switzerland had perhaps the most complete rural electrification in Europe, electrification of rural premises approaching 100% in both cases. In Denmark, development had been greatly assisted by the agricultural co-operative societies, which were an important feature of Danish agriculture, and in some districts small wind-driven generators had been used. In both countries, electricity was used for threshing, milking and other small-power purposes. In Switzerland an ingenious method of applying electricity to the operation of small plowing and cultivating machinery in the field had been developed, and during the war electrically-operated grass driers were introduced, some 50 large driers and 60 small ones being in use in 1946.

In Norway there was considerable interest in electrical plowing and cultivating. In Sweden, where, as in Norway, there is abundant water power, 85% of the 1,000,000 rural premises were already electrified, and a further 10% was scheduled to be connected to the supply by 1950 or 1951. The Swedish government contributed directly to the cost of new connections, and also operated a water power board responsible for generation. Distribution was largely in the hands of local "distribution associations," which took bulk supply from large generating undertakings. Electricity was used for threshing, crop drying and soil warming.

In Italy, there were a number of agricultural co-operative societies which, in addition to distributing electricity, owned and rented electrically operated equipment for threshing and small-power agricultural purposes. Considerable attention had been paid to electric plowing and cultivation; and several machines had been developed and used for the plowing of some thousands of acres.

In the U.S.S.R., a decree was issued in 1939 relating to the expansion of village power plants. In 1940, 92 water power and 60 thermal plants were in operation, but further construction was interrupted by World War II. In 1944 and 1945, some 1,600 plants were built, having a total capacity of more than 70,000 kw. and supplying power to about 700 tractor stations and 2,000 collective farms. Postwar plans provided for the generation, in 33,000 plants, many of them hydroelectric, of 2,000,000 kw. for agriculture and electrifying all machine and tractor stations. The agricultural uses of electricity included water pumping, threshing, drying and grinding, animal food preparation and irrigation and electrically operated plowing was planned.

For the rehabilitation of Greece after World War II, a 20-year national water power plan had been prepared, involving 16 hydroelectric stations connected by a high-voltage transmission network. Although no detailed plans had yet been made for rural electrification, such a network would obviously pave the way.

In Eire, the Electricity Supply board was authorized to carry out a rural electrification scheme on a national scale at a cost of some £40,000,000. The outline of the organization for this scheme had already been drawn up. (See ELECTRICAL INDUSTRIES; PUBLIC UTILITIES; TENNESSEE VAL-

LEY AUTHORITY; WATER POWER.)

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Rural Electrification Administration

See PUBLIC UTILITIES; RURAL ELECTRIFICATION.

Rural Rehabilitation Loans

See FARM SECURITY ADMINISTRATION.

Russell Sage Foundation

See SOCIETIES AND ASSOCIATIONS.

Russia

See UNION OF SOVIET SOCIALIST REPUBLICS.

Russian Literature

Contemporary themes dominated soviet literature during the decade 1937-46. The generation which grew up after 1917 had taken its place in life, and the traits of character formed in these years acquired definite shape. The writers' attention was concentrated on the delineation of the ordinary soviet people who typified the contemporary soviet character. Great interest was aroused by *Tanker Derbent*, written by Yuri Krymov, who was born in 1908 and died in battle in 1941. This was the first attempt at the portrayal of the Stakhanovite movement, a new socialist attitude to work which was defined by Stalin as a "matter of honour, glory, valour and heroism." These traits are seen in Konstantin Simonov's play *A Lad from our Town*, in the poetry of the old Kazakh Jamboul (1846-1945), in that of the Armenian poet Avetik Isaakian, the Georgian poet Galaktion Tabidze, the Byelorussian Yanko Kupalo (1882-1942), the Ukrainian Pavel Tychina, the Russian A. Surkov and others. The individualistic poetry of Boris Pasternak, who confined himself to a personal theme remote from the common interests of the people and later took up the translation of Shakespeare, stood apart.

So stirred were the soviet writers by construction work of peacetime during the early years of the decade that the national defense theme in itself did not evoke a response of great moment except for isolated books such as Peter Pavlenko's *In the East* and Nicholas Panov's poem *Tank Commander*. Soviet literature was preparing for the struggle to come. A large part was played in this by the historical genre—for example, *Sevastopol* by Sergeyev-Tsenski, writer of the older generation born in 1863, and *Suvorov*, a historic poem by Konstantin Simonov. Works on the civil war were of special importance. In 1941 Alexei Tolstoy (1873-1945) completed his trilogy *The Road to Calvary* which he began in 1921. This novel, which traced the way by which the Russian intelligentsia found closer contact with the people in the epoch of the revolution and merged with them, was one of the most significant books of the period. Equally important was the role of Mikhail Sholokhov's novel *And Quiet Flows the Don*. The writer spent 14 years on it, completing it in 1940. It is an immense canvas of the Don Cossacks during the revolution. The philosophical problem that it raised was the tragedy of man torn away and isolated from his

people. Nicholas Pogodin's plays, *Kremlin Chimes* and *A Man with a Gun*, in which Vladimir Lenin and Joseph Stalin appear, aroused much interest.

The German invasion of the soviet union confronted writers with new and responsible tasks. More than 800 of the 3,500 soviet writers went to the front and more than 300 were awarded military decorations; 242 were killed in active service. Among these were Eugene Petrov (1903-1942), A. Gaydar (1904-1941) and V. Stavski (1900-1943).

At the beginning of World War II more "operative" genres—lyrical verse, short feature articles and good journalism on questions of special interest—were favoured. Articles by Alexei Tolstoy and Ilya Ehrenburg were extremely popular. Outstanding war correspondents were Konstantin Simonov, who wrote the series *From the Black Sea to the Barents Sea*, Vassili Grossman (*Stalingrad Notes*) and Boris Gorbатов (*Tales of a Soldier's Soul*). At the same time the war story was popular; this of course gave more scope for artistic invention than an ordinary feature story. Nikolai Tikhonov, who remained in Leningrad throughout the blockade, described it in a book *Traits of the Soviet Citizen*; L. Sobolev pictured various aspects of navy life in his *Sea Soul*.

Stories and feature articles appeared in the papers alongside important information. By the beginning of 1942 a somewhat larger genre gained a footing; stories endeavoured to give a more general picture of the war. *Immortal People*, Grossman's war novel, traced the steps by which the soviet army grew stronger in the test of war; Gorbatov's *The Unconquered* conveyed the staunchness of the spirit of the soviet people in the territory occupied by the Germans; Mikhail Sholokhov's *Science of Hatred* and Wanda Wasilewska's *Rainbow* gave a forceful picture of atrocities of the fascists.

A. Bel developed the genre of the documentary story; his *Eighth of December*, *The Volokholamsk Highway*, *Panfilov's Men* and *On the Boundary Line* were about the days of the defense of Moscow and the beginning of the end for the Germans outside Moscow in Dec. 1941. Of great importance, too, was Simonov's *Days and Nights*, in which the author tried to convey the immensity of the Stalingrad battles and the courage of the soviet soldiers. But perhaps the most prominent place among war stories was taken by Alexander Fadeyev's novel *Young Guard*. The narrative was written around actual events. It was the history of the underground organization of the soviet youth formed for the most part from schoolchildren in the Donbas colliery town of Krasnodon in the German rear. For some months this organization harassed the fascists but eventually it was discovered, the members were caught and put to death. Fadeyev raised the narrative to a high literary level, treated the documentary material with creative talent portraying the people who actually existed as characters that are typical and throwing into relief the most essential traits of soviet youth. The underlying idea was that the soviet people considered themselves representatives of the nation and that this first and foremost determined their behaviour.

The historical genre continued to develop during World War II. The last part of the best soviet historical novel *Peter the First* was left unfinished by Alexei Tolstoy's death. *Navoi*, a novel by the Uzbek poet and scholar Aini Aibek, was devoted to the life of Alisher Navoi, the founder of the Uzbek literature of the 15th century. V. Shishkov, a representative of the older generation, wrote *Yemelyan Pugachev*, a novel of the peasant rising of the 18th century. A. Stepanov's monumental novel *Port Arthur* aroused wide interest.

Outstanding among volumes of lyrical verse which number several score was A. Surkov's *Songs of a Wrathful Heart*. There was a marked tendency to broad synthesis, to the imagery of the artistic magnitude characteristic of soviet literature. This was determined by the breadth of outlook and wealth of social experience of soviet writers, their many-sided and direct participation in the life of the country. The long poem was one of the most widespread poetic genres during World War II.

Beginning with Nikolay Tikhonov's romantic poem *Kirov Is With Us*, which was published in 1941 and dedicated to besieged Leningrad, soviet poets published many poems on widely diversified themes. A realistic and stirring picture of Leningrad was given by the women who took part in its defense, for example, Vera Inber, who wrote *Pulkovo Meridian* and Z. Shishova, who wrote *Blockade*. In a place apart were the poems constructed on the basis of documentary material that passed through the keenly lyrical perception of the poet: Pavel Antokolski's poem *Son*, dedicated to the memory of his own son who was killed in the war, was an expression of personal grief merging in the general flood of national feeling and finding its loftiest expression in it; Margarita Aliger's long poem *Zoya* was on the heroic young girl partisan Zoya Kosmodemyanskaya who was tortured and hanged by the Germans.

The most prominent place among war poems was taken by Alexander Tvardovski's *Vassili Tyorkin*. This was an attempt to depict the Russian soldier, who bore simply and with optimism the hardships of war. The poet, who made wide use of colloquial Russian, drew most varied pictures—everyday and tragic—of the life of the soviet army at the front. He made a thorough study of his subject. He succeeded in creating work of high literary significance that acquired instant popularity, especially in the army.

Soviet wartime drama presented a less rich picture than did prose and poetry; nevertheless it had a number of plays that attracted wide attention and assumed a part of importance at the time. One of the first plays to be published was *The Russian People* by Simonov, fertile and versatile prose writer, poet and journalist. Against the background of a Russian garrison in a small town Simonov showed the greatness of a soviet soldier's soul, his readiness to sacrifice and do brave deeds for his country's sake. The theme of rallying the Russian people at the moment of danger was chosen by Leonid Leonov for his play *The Invasion*. Alexander Korneychuk's play *The Front* aroused wide interest. On the one hand it showed how the soviet army commanders mastered the new machinery and technique of warfare while the war was going on and on the other hand it was unsparing in its exposure and condemnation of routine methods and those who did not understand the new experience.

Folklore—the creative literature of the people handed down by word of mouth—received a new impetus and was given an unusually wide scope during World War II. It responded in a variety of ways to the events of the epoch. Songs, tales, proverbs and axioms made up in the soviet army, among the partisans, among the children and so on expressed the soviet people's patriotic inspiration and faith in their own powers.

(L. Tv.)

A special resolution of the central committee of the Communist party denounced in Aug. 1946 the work of two Leningrad reviews (*Zvezda* and *Leningrad*), accusing them of sponsoring "anti-soviet writers." The once popular humorist Mikhail Zoshchenko and the well-known

poetess Anna Akhmatova were singled out for a particularly virulent attack. Zoshchenko was charged with showing "an unpatriotic attitude during the war" and with lampooning soviet society in *The Adventures of an Ape*. Akhmatova's poetry was proclaimed "empty" and "imbued with bourgeois mentality." A more general charge of "servility to modern western bourgeois civilization" was laid at the door of the Leningrad reviews; they were accused of "poisoning the mind of soviet youth." After listening to a report from Andrey A. Zhdanov, the official head of the Leningrad communist organization, the Leningrad writers hastened "to assure comrade Stalin that they would be able to overcome in a short time these major shortcomings." This episode was but part of a general tightening-up of the ideological party line which came as a reaction after wartime "laxity": Moscow theatres were severely rebuked for including in their repertoires "decadent" bourgeois plays by Somerset Maugham, Sir Arthur Pinero and others, and the composer Shostakovich was taken to task for his *Ninth Symphony*, proclaimed "a formalistic trifle."

Nikolay Tikhonov was dismissed from the post of chairman of the Union of Soviet Writers and replaced by a "collective."

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Russian S.F.S.R.

See UNION OF SOVIET SOCIALIST REPUBLICS.

Ruthenia

See CARPATHO-UKRAINE.

Rutledge, Wiley Blount, Jr.

Rutledge (1894–), U.S. jurist, was born July 20, 1894, in Cloverport, Ky. He received his B.A. degree from the University of Wisconsin in 1914, and his law degree from the University of Colorado in 1922. Admitted to the Colorado bar in 1922, he practised in Boulder. Four years later he joined the University of Washington as professor of law, remaining at that institution until 1935, when he became professor of law and dean of the law college at the University of Iowa. He left the latter school upon his nomination in April 1939 as associate justice to the U.S. court of appeals for the District of Columbia; he entered his new duties the following month. On Jan. 11, 1943, Pres. Roosevelt named him associate justice to fill the vacancy left in the U.S. supreme court by the resignation of Justice James F. Byrnes. He was sworn in Feb. 15, 1943. Only 48 years old at the time, Justice Rutledge was the second youngest member of the court (Justice William O. Douglas, the youngest member, was then 44). Justice Rutledge entered dissents in the supreme court ruling (Feb. 4, 1946) that upheld the legality of the U.S. military tribunal which sentenced Lt. Gen. Tomoyuki Yamashita and also in the ruling (Feb. 11, 1946) denying clemency to Gen. Masaharu Homma.

Ryder, Charles Wolcott

Ryder (1892–), U.S. army officer, was born Jan. 16, 1892, in Topeka, Kansas. A graduate of the U.S. Military academy at West Point, (1915), he was commissioned a second lieutenant. During World War I he fought on the western front, was cited for heroism and received a number of decorations. After the war he was stationed in China and served for a while in military intelligence. One of the commanders of the U.S. armies that landed in French North Africa on Nov. 8, 1942, Maj. Gen. Ryder led the force that landed in Algiers and he negotiated surrender of the French garrison there.

After the occupation of Morocco and Algeria Gen. Ryder's armies were placed under the command of Gen. K.A.N. Anderson of the British 1st army on Feb. 11, 1943. Ryder himself commanded the 34th national guard division in the drive on Bizerte.

Allied headquarters in Italy announced July 29, 1944, the transfer of Ryder from the Italian theatre of war to new duties in the U.S.

Rye

World rye production was estimated by the United States department of agriculture at about 1,000,000,000 bu. in 1937. Germany produced about one-third of this total and half of the crop of Europe. Rye production declined steadily during the war period although it was the chief bread grain in several European countries and in parts of the soviet union. The supplies were so small that it could not be substituted for wheat, and the price was also higher in the United States.

Rye was the one U.S. grain crop which did not play an important role during World War II; it ended the decade 1937–46 with a decline to the level of pre-World War I. Rye had been grown on about 3,500,000 ac. after 1914 except for a brief period of expansion in 1919, when acreage increased to more than 7,000,000 ac. and again in 1922, when the acreage was 6,757,000 ac. and a record high yield of 14.9 bu. per ac. returned a crop of 100,986,000 bu., the all-time record. In 1937 the acreage harvested for grain was back at 3,846,000 ac. and the crop to 49,830,000 bu. The decline in production continued, except for 1942, when again a yield of 14.9 bu. per ac. brought the crop up to 57,673,000 bu., to a low point of 25,500,000 bu. in 1944. Only about half of the rye acreage was harvested for grain: 56% in 1945 and 52% in 1944. Yields were low in 1933–34, about 8.5 bu. per ac. and, except in 1942, at about the prewar average through the decade 1937–46. After the beginning of the century there had been only five rye crops smaller than that of 1945.

U.S. rye prices declined in 1938 but began to recover in 1939 and advanced steadily until 1946. The use of rye during the decade was principally for feed. The 1944 crop,

U.S. Rye Production by Leading States, 1937–46
(In millions of bushels)

Rye	1937	1939	1941	1942	1943	1944	1945	1946*
U.S. Total	49.8	39.0	45.3	57.6	33.3	25.5	26.3	21.4
Nebraska	3.9	3.5	4.4	5.9	5.0	3.4	4.4	3.0
South Dakota	6.1	4.5	7.5	13.8	5.2	4.5	4.4	2.8
North Dakota	6.7	7.0	13.1	16.0	4.0	1.9	2.4	2.5
Minnesota	10.7	7.3	3.3	3.3	1.5	1.2	1.8	1.7
Wisconsin	4.5	2.3	1.6	1.6	1.1	1.0	1.2	1.0
Indiana	1.7	1.6	2.0	1.9	1.4	1.0	1.1	.8
Oklahoma . . . . .	.3	.5	1.2	1.1	.8	1.5	1.0	.6
Michigan	1.6	1.5	.7	1.1	.7	.9	.9	.7
Kansas . . . . .	.9	.6	.9	1.2	1.3	.9	.7	.7
Colorado . . . . .	.3	.2	1.0	1.3	1.3	.5	.7	.6
Pennsylvania	1.1	1.0	.7	.8	.6	.7	.7	.5
Missouri . . . . .	.5	.4	.4	.7	.4	.6	.6	.5
Illinois	1.8	1.2	.7	.5	.6	.7	.5	.4
Ohio . . . . .	.5	1.2	1.3	1.8	1.1	.6	.5	.3
Kentucky . . . . .	.3	.1	.4	.2	.2	.6	.5	.5
Virginia . . . . .	.5	.1	.3	.5	.4	.6	.4	.4

*Preliminary estimate.

stocks and imports, totalled about 55,000,000 bu., distributed as follows: food, 9,100,000 bu.; feed, 15,800,000 bu.; seed, 6,200,000 bu.; industrial uses, 10,300,000 bu.; and exports, 3,200,000 bu. Between the two world wars rye exports rose to more than 50,000,000 bu. (in 1922 and 1924), but then declined and a balance of imports was required after 1933. The decline in production of rye was because of the fact that it could not compete with wheat in income per acre, and the crop was grown as a supplement to other grains.

There were speculative flurries in the rye markets in 1945 and 1946.

During Feb., March and April 1946 the farm price of rye was higher than the price of wheat. (J. C. Ms.)

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Saar

See GERMANY.

Sabotage

See FEDERAL BUREAU OF INVESTIGATION.

Safety

See ACCIDENTS.

St. Croix

See VIRGIN ISLANDS.

St. Helena and Ascension Islands

See BRITISH WEST AFRICA.

St. John

See VIRGIN ISLANDS.

St. Kitts-Nevis

See WEST INDIES, BRITISH.

St. Louis

At the start of the decade 1937-46 St. Louis was pulling itself out of the depression. War in Europe in 1939 accelerated recovery and started a boom. The six most momentous years since the Civil War followed. The city was destined to play an active part in the nation's war effort because of its access to raw materials, fuel and labour. By April 1941, St. Louis already had received direct defense contracts totaling \$250,000,000 and construction was soon to be started on an \$80,000,000 small arms ammunition plant, largest of its kind in the world, and a \$60,000,000 T.N.T. plant. As war threatened the United States, new plants and expansions mushroomed. Before the close of the war, \$447,000,000 was spent on such new facilities. Historic Jefferson barracks, 120 years old, was a beehive of activity, and other major military establishments were springing up in and near St. Louis. Men and women from the St. Louis area were swelling the service forces by an eventual 125,000. St. Louis was the nation's first city to reach its quota in one of the early war loans. By the beginning of 1944 industrial output of the St. Louis area was double normal production. War contracts in that year equalled the total for the previous three and one-half years. Employment increased from 533,019 in 1940 to 662,600. By the close of the war in 1945 the St. Louis area had received government contracts totalling \$2,500,000,000.

Before the end of hostilities St. Louis was preparing for reconversion and the postwar period. On Aug. 1, 1944,

voters approved a \$43,427,000 bond issue for postwar public improvements. To this was added almost \$20,000,000 already on hand. For improvement of the water system \$19,000,000 would be spent; for improvement of airport facilities, \$14,000,000.

The war made the city air-minded. Under way in 1946 was a two-year program to triple the size and improve the facilities of Lambert-St. Louis municipal airport at a cost of \$10,000,000. The city was also in the process of acquiring a 4,000-acre site for a second municipal airfield costing \$15,000,000.

The voters on Aug. 6, 1946, approved another bond issue—\$4,000,000—to provide for a rubbish and ash collection service.

Many things happened in 1946, the end of an eventful decade. Agreements were reached to bring natural gas to the city within a year. For many years consumers had been furnished a mixture of natural and artificial gas. The Veterans' administration announced intention to give the city veterans' hospitalization buildings costing \$22,000,000. Jefferson barracks, historic frontier military post established in 1826, was deactivated and turned into housing for war veterans.

Politically, St. Louis changed from Democratic to Republican in the decade. An eight-year Democratic rule was ended April 2, 1941, when Republican William Dee Becker was elected over Mayor Bernard F. Dickmann, Democrat seeking a third consecutive term. But tragedy overtook Mayor Becker. During an aircraft demonstration before 5,000 spectators at the municipal airport on Aug. 1, 1943, a towed glider lost a wing and crashed. Among the ten occupants killed was Becker. He was succeeded by Aloys P. Kaufmann, who three months earlier had been elected president of the board of aldermen. Virtually unknown politically when he succeeded Becker, Kaufmann was elected to the unexpired term in Nov. 1944, by the biggest mayoralty margin since 1900, and was carried to a second term by a record majority of 108,654 to 54,512 on April 3, 1945. One of the city's proudest accomplishments was the elimination of the smoke nuisance, for 50 years a bane to St. Louis. It was effected chiefly by a drastic ordinance which, with other strong regulations, prohibited use of coal having less than 23% volatile matter in any except smoke-reducing equipment.

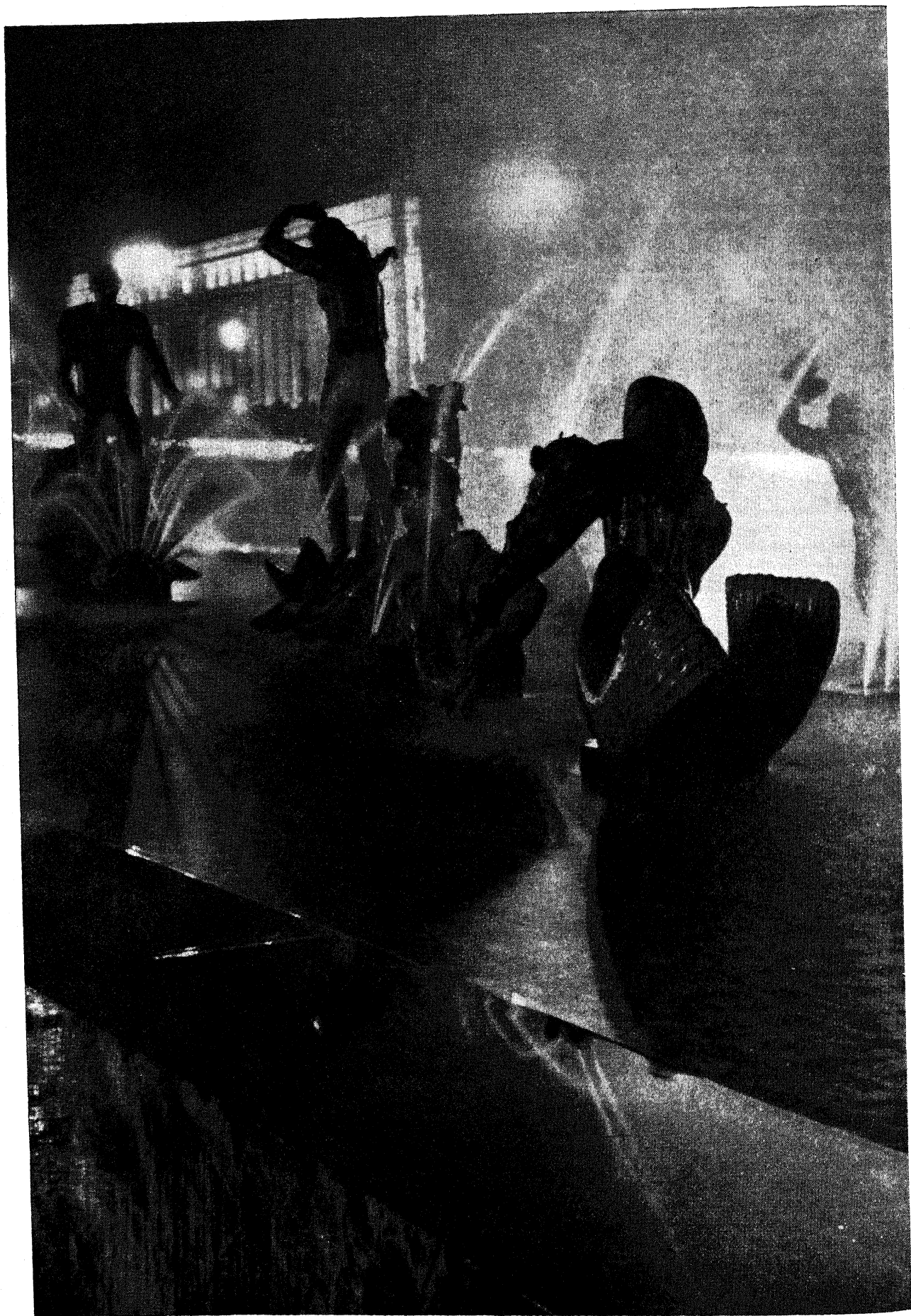
In Sept. 1942, civil service in city government was instituted.

Charter amendments required election of aldermen by ward instead of at large and equalized in size and population the 28 wards of the city.

To keep the city's financial head above water, a debated step was taken Aug. 1, 1946. A city income tax of one-fourth of 1% on gross earnings of individuals and net profits of businesses went into effect. The tax was estimated to yield \$4,000,000 annually, with half going to provide salary increases for the 8,000 municipal employees.

The prosperity of the latter half of the decade was exemplified by banking figures. At the beginning of 1937 there were 34 banks in the city of St. Louis with total resources of \$763,722,031, deposits of \$693,017,101 and capital and surplus amounting to \$63,004,759. Near the end of the decade there were 31 banks with resources totalling \$1,595,031,327, deposits of \$1,499,749,876 and capital, surplus and undivided profits amounting to \$80,331,891.

Throughout the period the municipal government maintained a sound financial position. The annual deficit grew smaller until in 1943 the budget was balanced for the first



time since 1928, and the fiscal year ended with a surplus of \$513,174. This surplus grew until 1945 when it reached \$3,145,275, then, because of increasing costs, began going downward sharply. The municipal debt, including bonds outstanding and those authorized but not issued, totalled \$87,391,000 in 1946—\$34,953,877 under the debt limitation.

The assessed value of real and personal property rose from \$989,297,745 in 1937 to \$1,053,130,974 in 1945. In that period the assessed value of railroads and other public utilities dropped from \$48,321,344 to \$47,171,689.

After administering the archdiocese of St. Louis for 42 years, Archbishop John J. Glennon, at the age of 83, was appointed to the College of Cardinals by Pope Pius XII on Dec. 23, 1945. While on his way home from Rome, Cardinal Glennon died in his native Eire.

A notable addition to the city's monuments in 1940 was Carl Milles's sculptural group, "The Meeting of the Waters," in the plaza facing the Union station.

By 1940, the population of St. Louis was 816,048, but because its boundaries, enclosing 61 populated miles, had not expanded since 1876, more than 500,000 persons lived in the area closely surrounding the city limits. (The 1940 census showed the St. Louis area pop. to be 1,367,977.)

(E. L. R.)

BIBLIOGRAPHY.—*Municipal Yearbook; Real Property Valuation Survey* (1941); "St. Louis Has Grown Up," *Fortune*, 32: 113-117 (July 1945); U.S. Bur. Census, *Financial Statistics of Cities*, ann.

St. Lucia

See WEST INDIES, BRITISH.

St. Pierre and Miquelon

See FRENCH COLONIAL EMPIRE.

St. Thomas

See VIRGIN ISLANDS.

St. Vincent

See WEST INDIES, BRITISH.

Saipan

See MARIANAS ISLANDS; PACIFIC ISLANDS, MANDATED; WORLD WAR II.

Sakhalin

Sakhalin Island, in the north Pacific Ocean, became in its entirety a part of the territory of the soviet union after World War II. At the Yalta conference, Feb. 11, 1945, the president of the United States and the prime minister of Great Britain secretly agreed to the reunion with Russia of southern Sakhalin (a Japanese possession since 1905) and to other territorial arrangements in return for a soviet undertaking to declare war against Japan within three months after Germany's surrender. Southern Sakhalin was subsequently shelled by U.S. warships, and a U.S. naval party landed on it in July 1945, but the island was not subjected to heavy bombing. Soviet troops invaded southern Sakhalin early in Aug. 1945, and a soviet communiqué announced on Aug. 28 that the clearing of Japanese troops had been completed. Russian colonization of northern Sakhalin had gone on during the war.

Japanese coal and oil concessions in the soviet territory of northern Sakhalin, granted in 1925, were a source of friction between the Japanese and soviet governments un-

"The Meeting of the Waters," a group of bronze figures by Carl Milles, dedicated at Aloe Plaza facing the Union station in St. Louis, Mo., on May 11, 1940. The two principal figures symbolize the union of the Mississippi and the Missouri rivers

Sakhalin: Statistical Data, 1938*

Item	Value (000's omitted)	Amount or number
Exchange rate		1 Japanese yen = 28.45 cents (1s. 2d.)
Finance		
Government revenues	\$16,219 (£3,317)	
Government expenditures	\$10,187 (£2,084)	
Minerals		
Coal		3,786,837 tons
Crops		
Oats		38,195 tons
Potatoes		33,388 tons
Fodder		26,026 tons
Forest products		
Pulpwood		290,559 tons
Timber		167,815,787 cu. ft.
Sea products		
Herring		150,584 tons
Fish and weed (dried)		12,595 tons
Manure		27,247 tons
Manufactures		
Total	\$40,609 (£8,301)	...
Wood and paper	\$21,248 (£4,346)	...
Beverage (sake)	\$1,106 (£226)	...
Exports—Total	\$42,589 (£8,711)†	...
Imports—Total	\$25,219 (£5,158)†	...

*Statistics for Karafuto only

†No data given for individual commodities

til the signature of the Moscow protocol of March 30, 1944, under which the concessions were cancelled and all property of the Japanese concessionaires was transferred to the U.S.S.R. in return for a payment of 5,000,000 roubles and a soviet promise to sell Japan 50,000 metric tons of oil annually during a five-year period after the conclusion of World War II. The most serious diplomatic crisis concerning these concessions occurred in 1939, when soviet authorities in northern Sakhalin levied fines against the Japanese concessionaires, who complained that the U.S.S.R. was applying pressure to restrict production from their concessions. The accompanying strike was settled only after difficult negotiations between Japanese concessionaires and soviet trade unions involved. (G. M. R. D.)

Salazar, Antonio de Oliveira

Salazar (1889–), Portuguese statesman, was born April 28, 1889, at Santa Comba Dão (Coimbra). He joined the Coimbra university faculty in 1916 as professor of economics and was finance minister for a week in the government of Pres. Antonio de Fragosa Carmona shortly after the revolution in 1926. In April 1928 he returned to the finance ministry. In July 1932 Salazar became premier; the following year (March 1933), a new corporative constitution was adopted, and the government became a dictatorship run by Carmona and Salazar.

In 1936 Salazar assumed the portfolios of war and foreign affairs, but in 1944 he yielded the war ministry. On May 18, 1945, in a speech before the national assembly justifying Portuguese neutrality in World War II, Salazar declared "It cannot be disputed that it served a positive interest of the Allied nations for us not to have become involved in the conflict." He also stressed the desire of his government to collaborate in the postwar world and affirmed the truly democratic character of his regime. But in a campaign speech of Nov. 9, 1945, he denounced democracy as a "hopeless system."

Meanwhile, Salazar had permitted the creation of political parties other than his own, that of the National Union, and announced national elections, the first in 20 years, for Nov. 18, 1945. The opposition, however, boycotted the elections, charging that their candidates had to secure "approval" by the National Union before they could be listed. The National Union won the elections.

Sales, Retail and Wholesale

See BUSINESS REVIEW.

844 Sales Tax

See TAXATION.

Saliège, Jules-Geraud

Cardinal Saliège (1870–), French prelate, was born Feb. 24, 1870, at Mauriac, France. Ordained in 1895, he later taught mathematics and theology and was cited for his service as an army chaplain during World War I. He was consecrated bishop in 1926 and elevated to the post of archbishop of Toulouse in 1928.

Archbishop Saliège distinguished himself during World War II by issuing a pastoral letter, read in all churches of his diocese, denouncing racial persecution. This action, which came in the midst of a nazi-ordered manhunt for Jews, displeased the German occupation authorities and he was placed under arrest, only to be released later because of his advanced age and ill health. He was permitted to remain in his archbishopric.

He was named to the Sacred College of Cardinals, Dec. 23, 1945, and was created and proclaimed a cardinal on Feb. 18, 1946. As illness prevented his personal attendance at the Rome consistorial ceremonies in February, he was given his red hat at a private Vatican consistory on May 17, 1946.

Salt

The production of salt is one of the world's most widely distributed mineral industries, as it is one of the oldest; man has always required salt, for food if for nothing else. Almost every country has some output, and production has been recorded in some fourscore of them. Known output in 1937 was in excess of 33,000,000 short tons, in amounts varying with the population and the industrial activity of the country in question. Heavily populated countries like India and China required from 1,500,000 to 3,000,000 tons for food uses only; on the other hand, a heavily industrialized country like the United States required several times as much salt for industrial uses as was consumed in food. Hence, nearly four-fifths of the world output continued to come from only eight countries, the five with the greatest industrial development (United States, Germany, Great Britain, France and Italy) and the three with the largest population (China, India and the Japanese empire), all with outputs in excess of 1,000,000 tons. Production data during World War II were too scattered to permit any estimates of total output, but the number of countries showing increases, up to double or more between 1937 and 1945, seemed sufficient to offset any likely decreases, leaving a margin of increase.

The United States continued to be the world's largest producer and consumer of salt, with 25% of the world total in 1937; since the United States output more than doubled during the following decade, the percentage was

Salt Industry in the United States
(Thousands of short tons)

	1937	1939	1941	1943	1945
Production	9,241.6	9,277.9	12,720.6	15,214.2	15,394.1
Evaporated	2,579.6	2,658.6	3,330.1	3,993.9	3,630.7
In brine	4,631.6	4,584.2	6,771.4	7,961.1	8,257.7
Rock salt	2,030.4	2,035.2	2,619.1	3,259.1	3,505.7
Uses					
Chemicals			8,515.6	10,509.0	10,335.8
Food production*			744.7	921.0	789.5
Food preservation† . . .			1,439.1	1,624.2	1,655.7
Table and household . . .			495.8	665.5	682.2
Health, comfort, safety‡ .			546.5	670.5	694.1
Other uses			878.7	823.8	1,158.4

*Agriculture and livestock feeding.

†Meat packing, fish curing, butter, cheese, canning, preserving, other food processing and refrigeration.

‡Water softening and purification, highways, railroads, dust and ice control.

probably greater in 1946.

The trend of U.S. output and consumption is shown in the accompanying table.

Uses.—As indicated in the table, chemicals absorbed over two-thirds of the total salt output; of the total chemical uses, soda ash alone accounted for nearly half the total consumption, while chlorine and chlorine compounds (other than salt itself) took one-sixth, with around five per cent for other chemicals. The uses of salt in connection with foods—their production, preservation and use—though the most familiar to the average person, accounted for only about one-fifth of the consumption, while uses connected with personal health, safety, comfort or convenience absorbed about 4% of the total.

The industrial phases of the war program required large amounts of salt for the production of soda ash, chlorine, while stock feeding and food processing also were deeply involved in the war food program. Among the many lesser uses in which salt or one of its derivatives contributed to the war program were water purification, treating roads and airfield runways, making smoke screens and smoke bombs, water- and mildew-proofing compounds, parachutes, high-octane gasoline, the processing of textiles, the production of synthetic rubber and other rubberlike materials, the production of magnesium metal, DDT, sulfa drugs, vitamins and many others. While some of these uses were merely adaptations of established commercial and industrial applications, others were new developments, confined to military needs for the time being, but many later adapted to peacetime civilian uses.

(G. A. Ro.)

Salvador, El

A republic on the west coast of Central America, the only one without a Caribbean littoral, El Salvador is the smallest Central American and the second smallest Latin-American state (area, 13,176 sq.mi.) but the most densely populated mainland republic in the hemisphere. The population was estimated in 1943 at 1,896,168; earlier official estimates included the following: 1939, 1,744,535; 1940, 1,787,930; 1942, 1,862,980. The density by an official 1942 estimate was 141.39 per sq.mi., with only one of the 14 territorial departments falling below 100 per sq.mi in density. Racial distribution was approximately 80% mestizo (including white) and 19% Indian. Some three-fifths of the pop. was rural, two-fifths urban. The capital is San Salvador (1943 est. pop., 107,813); other important urban centres are Santa Ana (46,806), Nueva San Salvador (formerly Santa Tecla; 24,016), San Miguel (18,945), Sonsonate (17,320), Cojutepeque (15,095), Ahuachapán (13,636), San Vicente (13,330), Zacatecoluca (10,822), and Suchitoto (10,350). Presidents during the decade 1937–46 were Gen. Maximiliano Hernández Martínez (1931–May 8, 1944); Gen. Andrés Ignacio Menéndez (May 9, 1944–Oct. 21, 1944); Col. Osmin Aguirre y Salinas (Oct. 21, 1944–March 1, 1945); Gen. Salvador Castañeda Castro, after the latter date.

(X.)

Four Constitutions.—During the decade 1937–46, El Salvador had four constitutions: the first had been in force since 1886 and was without doubt the one most widely approved by the people of El Salvador because of its liberal and democratic tendencies; the second was promulgated in 1939 and had marked dictatorial tendencies; the third, in 1944, was meant only to perfect and give a certain air of legality to even more absolutist tendencies, and retained almost nothing of the constitution of 1886; the fourth, in force at the end of the decade, was essentially modelled on the liberal-democratic charter of

1886. The ten years were in reality a period of difficulties and of undeniable historical significance for the country, in which its whole political, social and economic structure was subject to intense disturbances; it was a period of constant change, which agitated public opinion and gave strong evidence of the civic spirit of the Salvadorean people, and its old and ineradicable tradition of national unity and democracy.

The liberal and democratic tradition of the country, which had its historical roots in its Spanish origin and in its revolution against the kings of Spain at the beginning of the 19th century, found its expression in the constitution of 1886.

But toward the end of 1939, the strong desire of the government of President Martínez to introduce important reforms in that constitution became evident. A constitutional assembly, convoked in a plausible way, held its sessions under a state of siege at the end of 1938; thus recourse was taken to means often before used in Latin-American countries, that is, to call open meetings or plebiscites which, being held under government control, necessarily produced the desired results. A constitution resulted which brought about changes of a definitely totalitarian character. Public liberty was restricted; municipal autonomy, which had been one of the oldest and most cherished democratic traditions of the country, was destroyed. The principle that the president of the republic could not be re-elected, also one of the traditional basic elements of Salvadorean democracy, was annulled to all intents and purposes.

The constitution, promulgated and put in force at the beginning of 1939, was tolerated, although the vast majority of the people seemed opposed to it; it remained in force with a certain amount of public approval, as it made

some just and basic reforms with regard to the family and the financial administration of the country.

At the end of 1943, the government created new problems and activities designed to introduce reforms in the constitution, with the ostensible intention of prolonging the functions of the chief of state for a new period of time; it also intended—at least so it said—to introduce special legislation in the economic sphere with respect to the property of axis subjects; the country had declared war on those states in Dec. 1941. The constitutional assembly again met under a state of siege, and when the new measures were promulgated the country realized that they meant the creation of a totalitarian state in which all rights and privileges—religion, family, franchise, municipal administration, property, freedom of thought—were made subject to the decision of the chief of state, who was vested under the guise of some spurious reasons with absolute powers and rights. As soon as the country realized this, military forces of the garrison in the capital, including especially air force contingents and the First and Second Infantry Regiments, rose in open rebellion on the afternoon of April 2, 1944, Palm Sunday.

Revolt of 1944.—Fighting went on for more than 70 hours in the city and its surroundings, until the uprising was more or less defeated by noon of Tuesday, April 4, when white flags went up in some of the rebel positions. Summary military tribunals were set up which condemned to death leaders, officers and civilians considered guilty. More than ten of these were executed, and the country was outraged by these proceedings. A wave of panic and indignation swept the nation; further executions took place at short intervals, sowing anguish and terror in the hearts of Salvadoreans, as the arrests of citizens were going on all the time, sometimes with no more reason than slight suspicion. The country lived through days of anxiety and emotion, and discontent spread among all social classes, even including those circles that could be considered partial to the government. Underground movements began to unite their efforts, and the national spirit soon forged a formidable front of unity against this state of affairs. Quickly their efforts rose to the surface, manifesting themselves in passive resistance by the medical profession, aided by students and workers; the movement rapidly became a general one, paralyzing transportation, trade, the supply of electricity and food, etc. A general resistance committee was set up, which acted rapidly, and was finally invited to present its views. Only one outcome was possible, and a government crisis began which culminated in the abdication of President Maximiliano Hernández Martínez; congress accepted it on May 9, 1944, and chose General Andrés Bello Menéndez to succeed him.

When the national legislative and constituent assembly met again after President Castañeda's election in 1945, it restricted its powers of its own accord. It put the constitution of 1886 in force again with such amendments as constitutional science and experience had made necessary. So it came about that the statutes of 1886, revered by the people, were preserved intact basically in their political structure, with the addition of some economic, social and administrative clauses which increased the technical efficiency of the constitution. Under the new constitution, the prolongation of the president's term in office was prohibited, and the principle was affirmed that he could not be re-elected; institutions necessary for the development of the country were created, the right to rebellion was put in force again, the most important of the successes achieved by the Salva-



Routine examination at a health centre in Santa Tecla, El Salvador, one of many such centres, hospitals and jungle clinics set up in Central America during World War II through the combined aid of the U.S. and Latin-American countries

dorean people in their hard struggle for their rights; finally, the constitutional principles were laid down through which a legislative was created to work justly and carefully, a legislative which had no dictatorial force, and could not suppress its revolutionary spirit.

Short Menéndez Term.—General Menéndez set up a caretaker government dominated by the opposition. Ex-President Martínez and his family left the country under those circumstances, to live voluntarily in the United States. It appeared for a time that the country had regained a profound calm. The government of General Menéndez was almost at once recognized by the United States, Great Britain and all the countries with whom El Salvador maintained diplomatic relations. A new period of disturbance and uncertainty soon began, but it seemed to resolve itself in a gentlemen's agreement between the men directing the three branches of the government and the representatives of the armed forces. And so with the country in high tension, Oct. 20, 1944, arrived.

In the late evening of that day the national legislative assembly met in a special session, as new grave disturbances had occurred; it received President Menéndez' resignation and the proclamation of Colonel Osmin Aguirre y Salinas as his successor, designated to the executive by the army. The country saw itself thrust into a difficult situation full of alternatives; there was even the possibility that a government-in-exile might be formed in neighbouring Guatemala, which in turn might give rise to armed frontier incidents involving the two countries, which had always been on friendly terms.

Castañeda President.—On March 1, 1945, Gen. Salvador

Castañeda Castro was declared elected by the national legislative and constituent assembly; he initiated his term as president with good will and the earnest desire to promote the reconciliation of the various factions, and to restore national unity. Castañeda issued a proclamation calling for peace and unity, granted amnesty to those who were imprisoned for political reasons and demobilized the army which had been collected at the western borders of the country; through these measures the country soon returned to a normal state of affairs.

Foreign Policy.—Throughout World War II, El Salvador tried to keep alive the spirit of co-operation arising out of the struggle of the democracies. The nation was represented at such international conferences as San Francisco and Chapultepec, and the national assembly ratified the agreements reached there. On May 17, 1945, President Castañeda met the president of Guatemala, Dr. Juan José Arévalo, in San Cristóbal de la Frontera. The conversations were carried on in a very cordial spirit, and resulted in the projected formation of a progressive federation of the two countries. This great movement was retarded by material circumstances arising out of the difficult world situation, though it was later given a very strong impulse in practical ways. This idea of a steadily increasing connection with Guatemala did not in any way exclude the traditional federalist plan, as El Salvador continued to feel its indissoluble ties to the destiny of Central America, and to maintain very cordial relations with all the Central American countries.

On Sept. 12, 1946, the president of the International Court of Justice, Dr. José Gustavo Guerrero, an eminent Salvadorean attorney, invited to the city of Santa Ana the presidents of the Central American countries to dis-

El Salvador: Statistical Data

Item	1938		1940		1943	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Exchange rate						
United States		1 Salvadorian Colon = 40c		1 Colon = 40c		1 Colon = 40c
Great Britain		11.4 Colones = £1		10.15 Colones = £1 (1941)		10.17 Colones = £1
Finance						
Government revenues	\$7,848 (£1,605)		\$6,951 (£1,815)			
Government expenditures	\$7,862 (£1,608)		\$8,043 (£2,100)			
Gold reserves	\$5,283 (£1,081)		\$5,296 (£1,383)			
National debt	\$15,686 (£3,208)		\$16,571 (£4,327)			
Transportation						
Railroads		378 mi.		385 mi.		
Highways		1,476 mi.		3,709 mi.		
Communication						
Telephones		3,790				5,009
Telegraph lines . . . . .		...				2,675 mi.
Radio sets		10,000				11,000
Minerals						
Gold		12,065 oz.*		51,195 oz.*		29,007 oz.
Silver		15,981 oz.		163,670 oz.		220,976 oz.
Crops						
Corn		380,293 tons				461,149 tons†
Millet		59,432 tons				
Coffee		56,438 tons				148,929 tons†
Sugar cane		35,053 tons				114,660 tons†
Livestock						
Cattle		696,700†				672,650
Swine		597,800†				416,760
Horses, asses, mules		233,900†				182,704
Forest products						
Balsam		159 tons				
Exports—Total	\$10,946 (£2,239)	...	\$12,228 (£3,193)	...	\$22,530 (£5,584)	89,016 tons
Coffee	\$9,512 (£1,946)	...	\$9,350 (£2,441)	62,334 tons	\$17,188 (£4,260)	62,153 tons
Gold bars	\$589 (£120)	...	\$1,766 (£461)	93,875 oz.	\$986 (£244)	28,496 oz.
Sugar	\$200 (£41)	...	\$248 (£65)	4,148 tons	\$741 (£184)	12,318 tons
Imports—Total	\$9,147 (£1,871)	...	\$8,108 (£2,117)	...	\$11,943 (£2,960)	82,545 tons
Cotton textiles	\$691 (£141)	...	\$1,007 (£263)	1,306 tons	\$2,489 (£617)	1,514 tons
Drugs	\$319 (£65)	...	\$276 (£72)	108 tons	\$726 (£180)	221 tons
Wheat	\$260 (£53)	...	\$167 (£44)	4,222 tons	\$128 (£32)	2,223 tons
Defense						
Standing army personnel . . . . .		...		4,500		
Military expenditures	\$1,360 (£278)	...	\$1,480 (£386)			
Education						
Primary schools		1,296		1,330		
Enrolment		89,839		89,792		
Intermediate schools		\$		58		
Enrolment . . . . .		...		3,309		
Universities		1		1		
Enrolment . . . . .		...		506		
*Exports to U.S. 1939.	\$1939.		1941.			
†1944.	\$44	Secondary and normal schools.				

cuss possible union, but only the presidents of Guatemala and El Salvador attended. The conference was held in the city hall, and the prime ministers of the two countries, Dr. Eugenio Silva Pena and Dr. Hector Escobar Serano, took part in it, as well as a large number of the foreign diplomats accredited in El Salvador, among them the United States and the Mexican ambassadors, John F. Simmons and General Dagoberto Juárez Mora, and the British minister, Norman Mayers. At 12:30 P.M. the Agreement of Federation was signed, drawn up according to the short and objective model plan of Dr. Guerrero; it essentially arranged for the formation of a juridical commission to meet in San Salvador on Dec. 1 in order to put the previous investigations in force; its basic principles were peace, nonintervention in the internal affairs of the signatory states, aid to democratic governments and co-operation amongst the people and stimulation of cultural activities and just social reforms. (S. C. C.)

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Salvation Army

A religious organization, the Salvation Army operated in 98 territories of the world in 1946, preaching the gospel of Christ in 102 languages. During the decade 1937–46, it had recorded outstanding progress in its various fields of activity.

In 1937, Salvation Army work was started in the Philippine Islands and in French Equatorial Africa, and a delegation from Mexico City requested the organization to assume activities there. Activities benefiting the deaf and dumb were pioneered in Sweden, Finland, Korea, Denmark and Norway. Publication of the only magazine for deaf mutes was originated in Sweden. Norwegian Salvationists, in addition to their regular visitation, escorted deaf and dumb to meetings and back to their homes.

A new approach to family welfare work grew in the United States as Salvationists considered the family as a unit. Removal of the source of weakness in a family involved evaluating the physical, mental, moral and spiritual condition of each family member to find the proper remedy.

Early in 1938, an important crusade was announced—the International Youth Movement. The campaign aimed to teach good citizenship, self control, unity of mind and physical fitness through cultural and educational interests. In the United States, boys' clubs were established where supervised craftwork, recreational, social and spiritual relationships pointed the way to character building.

In China, although war had destroyed several Salvation Army halls, officers remained on duty, ministering first aid or providing artificial limbs and crutches. Authorities provided the organization with a truck which conveyed a 20-day food supply to 25,000 people. At Shanghai as many as 27,000 refugees were cared for, and thousands of ready-made garments and material were distributed.

Commissioner George L. Carpenter was elected the fifth International General of the organization in 1939, succeeding General Evangeline Booth.

The outbreak of war in Europe in Sept. 1939 expanded Salvation Army services, and trained workers were dispatched immediately to war zones. More than 100 huts and canteens mushroomed in or near naval and military bases in Britain, France and Finland.

Modern improvements at the Salvation Army Hospital in Anand, India, catered to as many as 300 out-patients

daily, and in-patients crowded it to twice its capacity. Medicine, X-ray facilities, major and minor operations and laboratory tests for fluid analyses, tuberculosis, typhoid, syphilis, gastric diseases and blood were offered free to people of all religious and social conditions.

At International headquarters in London, the first contingent of Salvation Army officers was organized in 1940 to serve with the British Expeditionary Forces, and a War Comforts department was founded. Mobile canteens, servicemen's hostels and Red Shield clubs were open night and day in all war areas. English military authorities requested the opening of a hospital and guest house for wounded soldiers and relatives. Mobiles provided tens of thousands of troops evacuated from Dunkirk with comforts. A railroad station hostel in England provided over 10,000 free beds to troops-in-transit. These activities typified a world-wide concentration on war work added to other emergency services and ongoing work.

Although the organization's International headquarters was destroyed during an air raid on London in 1941, administrative work continued from temporary headquarters. Elsewhere, war procedures continued with such additions as appointments of Salvation Army officers as chaplains, assumption of the responsibility for the social and religious welfare of evacuees in London, acquisition of vessels to serve seamen stationed on anchored boats off the coast and operation of a club and 13 mobiles in Singapore.

In the United States, war services of the Salvation Army were channelled through (1) clubhouses for servicemen as designated through United Service organizations (*q.v.*); (2) collection and salvage of materials valuable to defense; (3) evacuation and emergency housing for civilians; and (4) operation of mobiles at defense installations.

The organization participated in U.S.O., which joined six national welfare agencies to serve the religious, spiritual, welfare and educational needs of the armed forces and of defense workers.

The establishment of a postwar relief department in 1943 at international headquarters exemplified the organization's long-range view. On 23 fighting fronts, the Salvation Army continued filling the needs of war-worn peoples. Officers were detailed to North Africa, where the first Anglo-American service club was erected by the ministry of information following plans prepared by the Salvation Army.

During the Dieppe raid in Aug. 1943, Canadian officers accompanied the armed forces; they were also among the first in Sicily. Advancing with Gen. Douglas MacArthur's men in New Guinea, Red Shield workers established 13 recreation centres. Missionary work in East Africa advanced with the completion by Salvation Army officers of their study for a working knowledge of Kiswahili, the language chiefly used there, and subsequent printing of the Bible.

In the United States in 1944, increased effort was directed toward youth work and emphasis on war activities shifted to helping returned veterans, the bereaved and wounded. The Post War Relief department conducted correspondence courses in pertinent subjects for thousands of officers around the world to supplement their resources for dealing with distress and special emergencies.

Mass feeding was speedily organized for 20,000,000 to 30,000,000 Chinese war refugees.

By the end of World War II, the Salvation Army had carried religious and social activities to approximately 225,000,000 servicemen. By late 1945, 1,000 mobiles had

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travelled a distance equivalent to four times around the world. Salvationists visited approximately 595,000 wounded and sick servicemen in hospitals.

While the regular network of rehabilitation services continued, other war-related developments grew: a home in France for children whose parents were dislocated, a refugee boys' home and "warphanage" in China, soldiers' and sailors' rest homes in South America and the middle east, and a motor launch to reach convoys and visit outposts on island rivers in Australia.

In the postwar period, following the Army's positive reaction to war urgency needs, the organization revamped its facilities to serve men headed overseas as replacements, to help veterans return to civilian life, to assist their wives and families and to aid hospitalized servicemen.

During 1946, Salvation Army units were pressed into service to aid in securing temporary shelter for victims of the nationwide housing shortage. Youth activities were intensified particularly during the summer months, when over 27,000 mothers and children were emancipated from the blights of city summers at Salvation Army Fresh Air Camps.

During the countrywide clothing drive, Salvation Army centres shouldered their share of the job by collecting, repairing and crating garments for the needy overseas. Local corps and other units hurried a variety of relief supplies to war-torn countries. Many Salvation Army kitchens were converted to canneries where volunteers processed food for shipment overseas. Its world-wide chain of units facilitated the task and many governments requested the organization to render more aid than ever before.

By the end of 1946, the Salvation Army had 27,995 trained officers, 5,000,000 followers, and 17,996 corps and outposts.

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(D. MN.)

Samba

See DANCE.

Samoa, American

American Samoa comprises the island of Tutuila and all other islands of the Samoan group east of longitude 171° W., including Aunu'u, Tau, Olosega, Ofu and Swains islands and Rose atoll. For several years prior to 1899 the interests of the United States, Great Britain and Germany in the Samoan Islands had been the subject of misunderstanding and controversy. On Dec. 2, 1899, a tripartite convention between these three powers was signed in Washington; Germany was awarded those islands of the Samoan group west of longitude 171° W. and the United States was to receive such islands of the group as were east of that line.

The former German islands were mandated to New Zealand following World War I.

On April 17, 1900, the high chiefs of Tutuila ceded the islands of Tutuila and Aunu'u to the United States. However, it was not until July 14, 1904, that the Manua Islands of Tau, Olosega and Ofu were ceded by the high chiefs. Correspondingly, congress did not formally accept these cessions until Feb. 20, 1929. Jurisdiction was extended over Swains Island and the uninhabited Rose atoll by a joint resolution of congress on March 4, 1925. On Feb. 19, 1900, shortly following the Tripartite convention, the president, by executive order, placed the islands of American Samoa under the jurisdiction of the secretary of navy for purposes of administration.

The natives of American Samoa are Polynesian and are closely related to the natives of Hawaii and the Maoris of New Zealand. According to an official census on April 1, 1940, the population was 12,908. The Samoan language is probably the oldest form of Polynesian speech extant. It is closely related to the Maori, Tahitian, Hawaiian and Tongan languages.

Samoa differs from most large Polynesian communities in its system of chieftainships. The basis of this organization is an intricate system of graded titles. Essentially these titles are of two kinds—*Ali'i* and *Tulafale*. It is difficult to translate these terms precisely, but the former might be called titular chiefs and the latter orator chiefs. They are commonly referred to as chiefs and talking chiefs respectively.

All chiefs of Samoa are referred to by the generic term *Matai*.

Succession to a title is elective within a family and while heredity is a contributory qualification, general ability, popularity and the capacity to make a good speech are the principal considerations borne in mind when a title is to be filled.

Under such a system no feudal government based on the conception of a purely hereditary aristocracy had arisen by the end of 1946. The *Tulafale* or talking chiefs form a distinct class in Samoan society. They are ordinarily outstanding characters and natural leaders. They speak on behalf of chiefs (*Ali'i*) at important functions and place before the chiefs the wishes or the complaints of the people they represent.

American Samoa: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Finance						
Government revenues	\$105				\$371	
Government expenditures	\$119					
Transportation					\$153	
Highways		45 mi.				
Livestock						
Poultry				23,240*		
Swine				8,641*		
Exports						
Mats	\$666†	...	\$51†	...	No exports because of warlike conditions	
Copra	\$37†	1,000 tons†	\$25†	553 tons†		
Tapas	\$2†	65,000† sq. ft.	\$11†	228,000† sq. ft.		
Imports						
Total	\$189†		\$382		\$993	
Meats	\$36†	181 tons†	\$74	348 tons	\$233	456 tons
Cotton cloth	\$14†	137,811 yd.†	\$26	216,180 yd.	\$91	
Wearing apparel	\$12†		\$15		\$93	
Education						
Public schools						
enrolment						36§
Mission schools						3,000§
						6§

*1940.

†1939.

‡To United States only.

§1943.

Production and Use of Sand and Gravel in the United States
(Thousands of short tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945
Sand, total	63,385	57,114	72,542	78,674	103,835	107,371	82,053	68,978	71,726
Building	27,591	25,097	32,221	34,741	45,954	49,518	34,098	27,213	31,508
Paving	22,100	23,379	28,582	30,408	39,889	38,396	28,024	21,479	22,313
Moulding	4,954	2,320	3,728	5,005	7,246	8,256	8,925	8,983	7,191
Glass	2,799	2,109	2,468	2,760	3,475	3,622	3,972	4,443	4,682
Engine	1,803	1,378	1,470	1,635	2,023	2,559	2,862	2,853	2,772
Railroad ballast	1,418	673	1,259	958	1,634	1,970	1,320	1,212	1,083
Abrasives	1,067	502	668	856	1,002	807	838	898	643
Other uses	1,653	1,655	2,145	2,312	2,612	2,243	2,015	1,898	1,535
Gravel, total	126,275	124,206	153,466	159,634	184,880	196,975	152,011	125,805	123,798
Building	27,838	26,315	32,003	33,295	46,679	54,412	35,227	28,609	30,055
Paving	85,268	88,660	109,177	112,750	118,025	115,680	94,769	73,083	71,351
Railroad ballast	12,319	7,272	9,972	10,881	16,302	23,110	19,407	21,267	20,658
Other uses	851	1,960	2,314	2,708	3,873	3,773	2,607	2,846	1,734
Sand and gravel, total	189,660	181,320	226,008	238,308	288,715	304,346	234,064	194,783	195,524
Building	55,429	51,412	64,224	68,036	92,633	103,930	69,325	55,822	61,563
Paving	107,368	112,039	137,759	143,138	157,914	154,076	122,793	94,562	93,664
Railroad ballast	13,737	7,945	11,231	11,839	17,936	25,080	20,727	22,479	21,741

849

All *Matai* sit in the village, county and district *fonos* (councils). In addition, they represent the respective districts at the annual *fono* or general assembly.

Kinship ties are very important in Samoan social and economic life. All who are related by birth or adoption, through both male and female lines, are recognized as belonging to one kinship or family group. Land was held formerly by the whole family group and administered or distributed by the *Matai*. However, during the decade 1937-46 the tendency was to recognize the occupier as the owner of the land.

This trend was given impetus by the war in the Pacific. Contact with large numbers of United States military personnel during the early stages of the war and the growing number of part-Samoan children, incidental to the war, tended to weaken the position of the *Matai*, especially in regard to the institution of private property. Modern education and certain governmental regulations and controls also contributed to modify the position and authority of the *Matai* in Samoan society.

There was also a remarkable trend away from "bush medicine" and a desire manifest by the native population for modern medical and surgical treatment. In 1945 alone, more than 400,000,000 units of penicillin were used in the treatment of yaws.

The results were phenomenal. Six Samoans were assigned to the 1946 class of the Native Medical Practitioners school at Guam.

The economic resources of American Samoa are of slight importance. The principal products of production are copra and mats woven from local grass and leaves. While World War II temporarily disrupted the Samoan economy, it was not believed that any profound changes would result therefrom.

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Samoa, Western

See MANDATES.

Sanctions

See INTERNATIONAL LAW.

Sand and Gravel

There is little that is melodramatic in the uses of sand and gravel; they were not used in the concoction of a secret weapon to annihilate the axis in World War II, or in any piece of cunning strategy to confound its evil purposes. Yet in spite of the fact that some 90% of the total output of these products during the war years went

into such prosaic uses as buildings, paving and railway ballast, and the remainder into various industrial applications, sand and gravel did their full share in contributing to the war program in the construction of munitions plants and of housing for the workers, in airfield runways and essential highways and in a score of lesser ways.

In the accompanying tabulation of the production of sand and gravel in the United States, and their distribution by uses, one can trace the effects of World War II along every line. Consumption in building and paving work expanded rapidly, reaching a peak in 1942. After the bulk of war construction work had been completed, these uses shrank heavily, and it was only with the beginning of the postwar housing program in 1945 that there was an upturn in this type of consumption. Other applications, connected with industrial processes and the transportation of industrial products developed somewhat more slowly, but in many cases to a later and relatively higher peak. Most of these applications did not begin to decline until 1944, and then only to a minor degree.

The only other country for which statistics were available was Canada, where progress was of much the same order as in the United States, though of course on a smaller scale, and with the effects of war construction less pronounced. Production of sand and gravel in Canada during the decade was as follows, in short tons:

1937	27,001,301	1942	29,349,907
1938	32,223,882	1943	25,744,469
1939	31,294,341	1945	28,399,986
1940	31,375,415	1946	29,021,249
1941	31,604,806		

From these figures it is to be noted that the postwar building program got under way in Canada a year earlier than in the United States, and also that the per capita production was greater; while Canada had only about 9% of the population of the United States, the output of sand and gravel was 13% of that of the United States.

(G. A. Ro.)

Sand Island

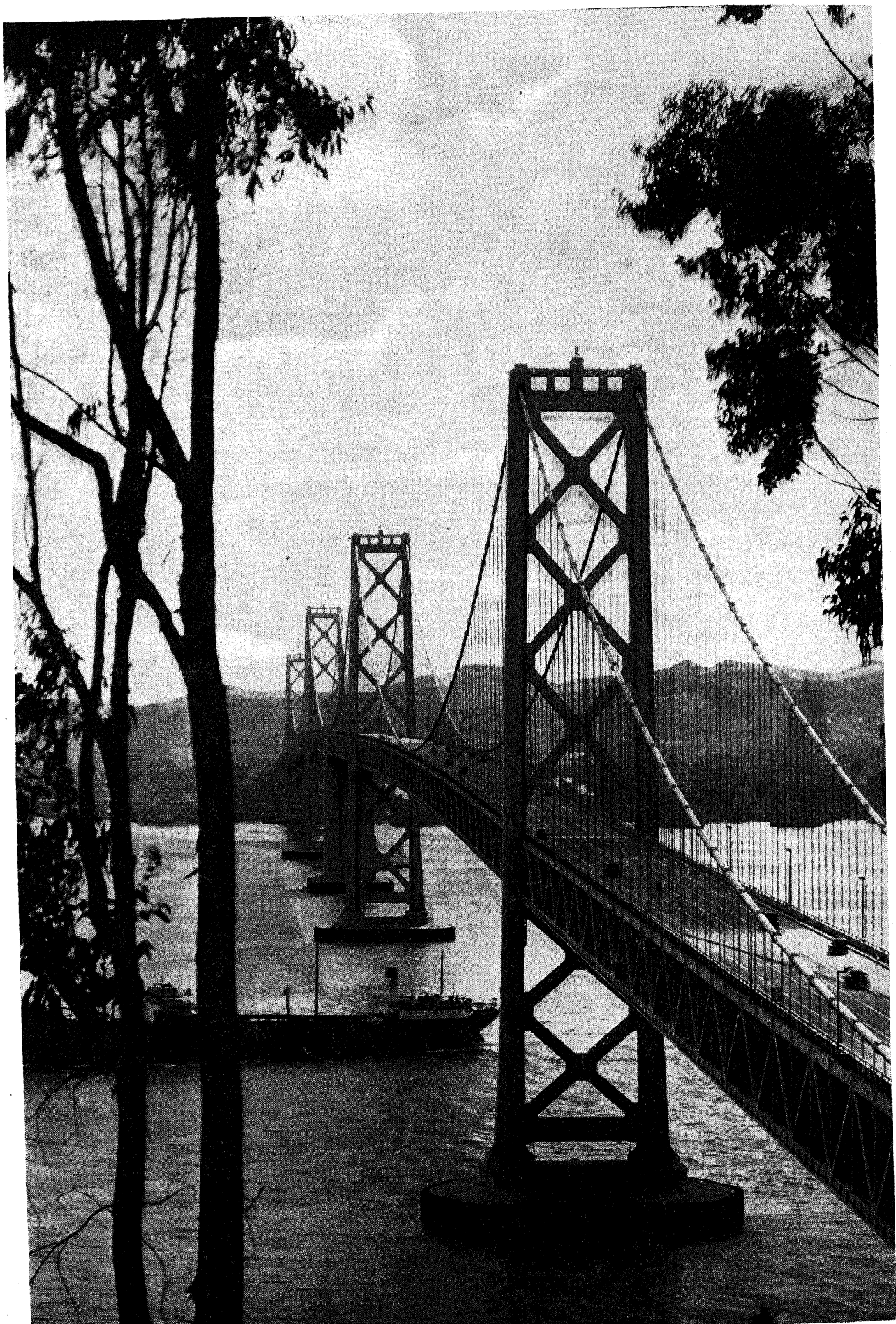
See PACIFIC ISLANDS, U.S.

Sandstone

See STONE.

San Francisco

After the Japanese attack on Pearl Harbor, San Francisco became the principal mainland base for the United States war in the Pacific. Facilities around the 450 sq.mi. land-locked San Francisco bay were quickly expanded. They included Mare Island navy yard at Vallejo, Hunters Point navy yard at San Francisco, numerous supply depots, cantonments and training centres, a score of shipyards and



a large and diversified industry. Nearly one-third of all ships produced in the U.S. during the war were built on the bay.

San Francisco became virtually the west coast capital of the U.S. during the war. Here were army and navy headquarters and 110 agencies of the armed services. Some 200 other federal agencies of wide regional jurisdiction were increased to 262.

The United Nations Conference on International Organization met in San Francisco from April 25 to June 26, 1945, drafted and adopted the United Nations charter.

Resident population within the 44.82 sq.mi. land area of the city and county of San Francisco increased from an estimated 634,498 in 1937 to 827,400 in 1946, while that of all the nine counties around the bay increased from 1,690,000 to 2,543,100.

Persons employed in San Francisco in 1946 were estimated at about 400,000, which compared with about 315,000 in 1937. Comparable figures for the nine-county bay area were 940,000 and 660,000. The wages in the manufacturing industries in the San Francisco-Oakland area (five counties) increased from \$122,916,300 in 1937 to about \$475,000,000 for the year ending Dec. 31, 1945.

The San Francisco Employers council was organized in 1939 to attempt to adapt to the local situation the principles of labour-and-management organization as followed in England and Sweden. Its beginning membership of 1,100 employers was increased to 2,200 by July 1, 1946. The council advocated industry group collective agreements with labour unions. In seven years it negotiated more than 1,000 such agreements and settled about 2,000 labour controversies. Strikes in the city decreased from year to year. In 1945 it had only 18, according to the bureau of labour statistics of the U.S. department of labour. This ranked San Francisco 30th among 89 U.S. cities that had ten or more strikes.

Business activity in San Francisco during 1945, as measured by cash income of civilian residents, amounted to \$1,619,566,000 as compared to \$739,000,000 in 1937, or an increase of 119%. San Francisco bank debits for 1945 were \$21,248,370,000 or about \$10,256,000,000 more than for 1937, while bank clearings for 1945 amounted to \$15,743,541,000, compared with \$7,913,846,000 in 1937. Retail sales in San Francisco for 1945 were estimated at \$846,081,000 or about \$456,000,000 more than in 1937. Sales at wholesale rose to an estimated total of \$3,016,258,000 for 1945 or \$1,729,000,000 more than the 1937 estimate.

San Francisco became united with the rest of the bay area by the building of two great bridges, largest in the world, across the bay. The San Francisco-Oakland bay bridge was opened to traffic on Nov. 12, 1936, and the Golden Gate bridge on May 27, 1937. The San Francisco-Oakland bay bridge, costing \$80,000,000, was financed through the sale of bonds, to be retired out of revenue. The bridge had been crossed by 157,363,833 motor vehicles and more than 152,080,000 train passengers by June 30, 1946. Revenues collected up to that time were \$51,765,435.08. The Golden Gate bridge, costing \$35,000,000, was also financed through the sale of revenue bonds. Up to June 30, 1946, the bridge had been crossed by 43,807,846 vehicles, and the revenues collected amounted to \$21,875,900.66. (See BRIDGES.)

To celebrate completion of the bridges, the city held the Golden Gate International exposition on man-made Treasure Island in mid-bay for 254 days in 1939 and 128

days in 1940. The total number of visitors to the exposition for the two periods was about 17,000,000. Out-of-state tourists in California during the two years of 1939 and 1940 numbered 2,530,643 and their expenditures within the state totalled \$328,762,470, according to Californians Inc. (See FAIRS, EXHIBITIONS, EXPOSITIONS.)

Mayor Roger D. Lapham took office on Jan. 8, 1944. Under his tutelage the people voted on May 16, 1944, for unification of the city's streetcar systems and payment of \$7,500,000 for the privately-owned Market street railway. On Nov. 6, 1945, they voted a bond issue of \$20,000,000 for improvement of San Francisco airport, to make it second in size only to New York's La Guardia field. Work began on May 27, 1946.

A petition for the recall of the mayor, supposedly inspired by a streetcar fare increase from seven cents to ten cents, resulted in his retention at an election on July 16, 1946.

San Francisco partially solved its automobile parking problem by building a four-story underground garage beneath Union square in the downtown shopping district. Opened to the public on Sept. 12, 1942, it had a capacity of 1,700 cars and cost \$1,550,000.

During the decade 1937-46, 1,200 conventions held in San Francisco attracted almost 1,000,000 visitors, who spent an estimated \$65,250,000 in the city. (R. D. L.)

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San Francisco Conference (1945)

See UNITED NATIONS.

San Francisco-Oakland Bay Bridge

See BRIDGES; SAN FRANCISCO.

San Marino

The tiny republic of San Marino is situated on the eastern slopes of the Etruscan Apennines in the Italian peninsula. Area: 38 sq.mi. Population (1939), 14,547. Chief town: San Marino. Legislative power was vested in the grand council of 60 elected members, two appointed every six months to act as regents.

In April 1939 San Marino renewed her treaty of friendship with Italy, but on the outbreak of World War II remained neutral. On Aug. 3, 1943, the fascist grand council was dissolved and a provisional council appointed; San Marino thus returned to her old democratic traditions. In the autumn of 1944, when the fighting in Italy seemed likely to engulf San Marino, this small state emphatically asserted its neutrality, but the Germans violated it, and on Sept. 19 and 20 Canadian troops entered the republic, after which San Marino declared war on Germany. A new treaty with Italy was signed in March 1946. (J. RA.)

Santo Domingo

See DOMINICAN REPUBLIC.

Sao Tomé

See PORTUGUESE COLONIAL EMPIRE.

Sapieha, Adam Stefan

Cardinal Sapieha (1867-), Polish prelate, was born May 14, 1867, at Krasiczyn, Poland. Preparing for the priesthood, he studied theology at Innsbruck and Rome, and was ordained in 1893. He was named president of

"The Rock", a Christian social organization in 1904, and was appointed adviser to the Vatican on Polish affairs the following year.

He was named bishop in 1911 and was elevated to archbishop in 1925, when the Cracow diocese was lifted to the status of an archdiocese.

Archbishop Sapieha, who had strong feelings with regard to questions of propriety and public morality, at one time created a sensation by his refusal to admit King Carol of Rumania, then in Poland on an official visit, into the Cracow cathedral because of the king's relationship with Mme. Lupescu. During World War II, he locked the doors of the Wawel cathedral in 1940 to prevent nazi ingress and personally retained the keys. Nominated to the Sacred College of Cardinals Dec. 23, 1945, he was created and proclaimed a cardinal at the consistory of Feb. 18, 1946.

Sapphires

See GEMS AND PRECIOUS STONES.

Sapphires, Synthetic

See MINERALOGY.

Sapru, Sir Tej Bahadur

Sir Tej Sapru (1875-), Indian judge and government official, was born Dec. 3, 1875. He was educated at Agra college and practised law at Allahabad, where he achieved a reputation as one of India's most brilliant lawyers. He later became president of the Indian Liberal federation.

Sapru played a prominent part in the Round Table conferences in London in 1930-32. He also served on the United Provinces Legislative council and on the Imperial Legislative council. As a representative of the non-party group, he had several discussions with Sir Stafford Cripps during the latter's first mission to India and in July 1942 suggested that Britain unequivocally grant India complete self-government within a year after the end of World War II.

Saracoglu, Shukru

Saracoglu (1890?-), Turkish statesman, was born in Odemis, Turkey. Educated in Turkish civil service schools, he studied law at Lausanne university, Switzerland. He served in the Turkish army during World War I, joined Mustafa Kemal Pasha (Kemal Ataturk) after the armistice and fought against the Greek forces in 1921. After the abolition of the sultanate, Saracoglu became a member of the national assembly as deputy from Izmir, rising high in the councils of Mustafa Kemal's party. During his tenure as minister of justice (1932-38), he brought about numerous legal reforms and continued Kemal's work of westernizing Turkish institutions and customs.

Named foreign minister after Kemal's death in 1938, Saracoglu followed a consistent policy of neutrality during the first years of World War II. In July 1942 he was named prime minister, and after the re-election of President Ismet Inönü in March 1943, Saracoglu headed a re-organized cabinet. On June 15, 1944, he assumed the portfolio of foreign affairs when the incumbent, Numan Menemencioglu, resigned in a dispute over whether German ships should be allowed to pass through the Dardanelles. Saracoglu promised at that time, although Turkey was still neutral, that Turkish "might and right" would not be used against the Allies, and on Aug. 2, 1944, he an-

nounced that Turkey had broken relations with Germany at the request of Great Britain and the United States. Saracoglu resigned as premier, Aug. 4, 1946, and was succeeded by Recep Peker.

Sarawak

See BORNEO, BRITISH; BRITISH EMPIRE.

Saskatchewan

Created by an act of parliament on Sept. 1, 1905, as the central Canadian "prairie province," Saskatchewan is more prairie-like than Manitoba on the east or Alberta on the west. But its top third, meeting the Northwest Territories, is true "North Country" of many lakes and rivers and dense bush. Of its 251,700 sq.mi., 13,725 are water. The bottom third of the province, similar to Montana and North Dakota on which it borders, is an extension of the U.S. great central plain.

In 1941, Regina, the capital, had a population of 58,245 and the other centres were Saskatoon (43,027), Moose Jaw (20,753), Prince Albert (12,508). The decade 1937-46 saw unusual shifts in the province's make-up. Affected first by drought conditions and later by the impact of World War II, people began moving from the country to the towns and cities. The population, however, remained preponderately rural. Of the 921,281 in the 1931 census, only 290,905 were urbanites; and of the 895,992 in 1941, only 295,146. These figures indicate another effect of drought and the war: Saskatchewan lost many of its people to other Canadian provinces, and in 1946 the decline was still in evidence, with the dominion bureau of statistics estimating a further drop in population to 845,000. Although some of the loss was recovered by the return of war veterans, the federal Redistribution act of 1946 indicated the long-range aspects of the decline; Saskatchewan's representation in the house of commons (based on population) dropped from 21 to 20. In 1941 the four main racial groups in order of size were British, German, Ukrainian and French; and the four largest religious bodies in order of strength were Roman Catholic, United Church of Canada, Anglican and Lutheran.

Lieutenant-governors for the 1937-46 decade were: A. P. McNab (Oct. 1, 1936-Feb. 27, 1945); Thomas Miller (Feb. 27, 1945-June 22, 1945); R. J. M. Parker (after June 22, 1945). Premiers were: W. J. Patterson (Nov. 1, 1935-July 10, 1944), T. C. Douglas (after July 10, 1944).

Despite the hardships suffered during the drought in the latter part of the 1930s, and despite the population losses caused by World War II, Saskatchewan prospered during the decade 1937-46. Largely dependent on agriculture, which in 1945 provided 58% of her employment and 86% of her total production, the province experienced steady expansion in value of farm products, farm cash income, and farm investment capital. The latter was an expression of confidence in Saskatchewan's agricultural future, which was underlined by the creation in 1944 of a \$200,000 agricultural research laboratory empowered not only to help maintain farm productivity but also to find new uses for the province's main crops.

Industrially, too, Saskatchewan showed marked expansion during the decade. The number of factories increased by almost half, the number of employees and the amount of capital invested almost doubled, while the value of goods produced more than doubled. There was proportionate activity in raw materials production, especially in mining; the big zinc-copper mine at Flin Flon hit its stride, and helped to increase annual mineral production from \$6,970,000 to \$22,291,000.

As a result of this agricultural and industrial expansion during the decade, Saskatchewan's financial position improved. In 1939 the province's share of the national income was \$236 per person: by 1944 the figure had increased to \$483.

The most interesting developments during the decade were political in nature. For the second time in the history of the province the Liberals suffered defeat at the polls. From 1905 to 1944 there had been a line of Liberal regimes broken only by the Conservative government of 1929-34; but in 1944 the left-wing Co-operative Commonwealth Federation swept all but five Liberals out of the 55-seat legislature.

At its first session in 1944, the Douglas government passed a legislative record of 120 laws, many of them socialistic. New departments were set up. The department of reconstruction and rehabilitation, first in Canada, was given jurisdiction over housing, rural electrification, rural plumbing and co-operative farming. The department of co-operation and co-operative development was given power to legislate for commercial co-operatives: with 513 co-operatives in 1943, this department reported a peak of 876 co-operatives at the end of 1945, with a membership of 229,000, and annual business worth \$199,000,000. The department of natural resources and industrial development had power over the utilization of natural products; by 1946, the Douglas government was operating lumbering, fish-filleting, woollen, leather, shoe, sodium-sulphate, brick, fur-marketing, electric-power, and highway bus-line enterprises.

The department of labour, which the C.C.F. administration also established, in view of the increasing industrialization of Saskatchewan, consolidated and revised various provincial labour laws already on the statute books, and enacted many new ones, such as comprehensive legis-

lation respecting minimum wages, apprenticeship and labour relations.

A marketing board was set up with wide powers over the handling of natural products. With an eye to increasing income available from the fish resources of the North Country lakes, which had expanded from \$250,000 to \$1,482,000 in the decade, the government in 1945 empowered a royal commission to study fish production, processing and marketing.

The following year an important fur conservation scheme got under way, with the white and Indian trappers of the North Country co-operating readily.

Besides putting into effect unusual economic and social policies, the C.C.F. government was active in other spheres. It began operating the first provincially-owned air ambulance capable of flying emergency cases from isolated areas to hospitals. It instructed the provincial university to open courses in Russian, the first Canadian university to do so. It imported a special instructor in basic English to teach a group of special teachers, and then sent the teachers among the 63,881 Saskatchewanites who in 1946 still could not speak either English or French.

As might be expected, the challenges by left-wingers of the tenets of liberalism were not unopposed by the Liberals. At a provincial convention in 1946 the former Liberal premier and provincial leader, W. J. Patterson, was deposed, and Walter A. Tucker, Liberal member of parliament for Rosthern, was put in control of Saskatchewan Liberal policies. He at once set about closing the ranks of liberalism.

(C. Cy.)

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Saskatchewan: Statistical Data

Item	1938		1941		1944	
	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number	Value (000's omitted)	Amount or number
Exchange rate						
Great Britain		4.867 Canadian \$ = £1		4.45 Canadian \$ = £1		4.45 Canadian \$ = £1
United States		1 Canadian \$ = 99.4 cents		1 Canadian \$ = 90.9 cents		1 Canadian \$ = 90.9 cents
Finance						
Provincial revenues	£4,255 (\$20,804)		£6,855 (\$27,641)		£7,116 (\$28,712)*	
Provincial expenditures	£4,293 (\$20,990)		£6,271 (\$25,286)		£5,100 (\$20,577)*	
Transportation						
Railroads		8,778 mi.		8,777 mi.		8,781 mi.
Highways		212,904 mi.		212,928 mi.†		212,834 mi.†
Communication						
Telephones		80,293		88,118		98,984
Telegraph lines		62,636		109,713		9,240 mi.†
Radio sets						129,298†
Minerals						
Copper		9,078 tons		16,162 tons		36,757 tons
Gold		50,021 oz.		138,015 oz.		122,782 oz.
Coal		1,022,166 tons		1,322,763 tons		1,372,766 tons
Zinc		14,981 tons		\$		43,565 tons
Silver		898,413 oz.		1,691,540 oz.‡		1,735,773 oz.
Crops						
Wheat		4,134,000 tons		4,080,000 tons		4,860,000 tons†
Oats		1,440,000 tons		1,323,000 tons		2,288,000 tons†
Hay and clover		286,000 tons		566,000 tons		490,000 tons†
Potatoes		184,000 tons		145,000 tons		76,000 tons†
Barley		120,000 tons		672,000 tons		1,308,000 tons†
Livestock						
Cattle		1,129,000		1,241,000		1,979,000†
Horses		806,000		801,000		783,000†
Sheep		337,000		330,000		513,000†
Swine		286,000		944,000		1,007,000†
Manufactures						
Total	£12,582 (\$62,206)†	...	£13,131 (\$58,237)?	...	£34,270 (\$138,280)§	...
Flour and feed mills	£3,866 (\$19,114)†	...	£3,224 (\$14,299)¶	...	£5,322 (\$21,475)§	...
Slaughtering and meat packing	£1,895 (\$9,368)†	...	£1,318 (\$5,846)¶	...	£8,405 (\$33,915)§	...
Butter and cheese	£1,636 (\$8,086)†	...	£1,667 (\$7,395)?	...	£4,455 (\$17,974)§	...
Petroleum products	£1,549 (\$7,660)†	...	£2,181 (\$9,673)¶	...	£4,062 (\$16,392)§	...
Education Enrolment						
Provincial schools		223,006		212,553		193,007
Private schools		2,767		3,416		4,414
Dominion Indian schools		2,465		2,373		2,377
Universities and colleges		5,901		7,121		6,310

*Provisional figures

†1942

‡1945

§War restrictions precluded publishing detailed data

¶1940

‡1937

¶1939

§1943

854 Sauckel, Fritz

Sauckel (1894–1946), German politician, was born Oct. 27, 1894, in Lower Franconia. A seaman during World War I, his ship was captured by the British in the English channel and he spent the remainder of the war as a prisoner in England. Sauckel joined the Nazi party at its inception and became one of its leading propagandists in Lower Franconia. He became a Nazi group leader in Thuringia and later a member of the provincial diet. He subsequently served as minister of the interior and state commissioner.

During World War II, Sauckel was chief commissioner for the utilization of manpower and met Hitler's request for greater production by rounding up slave labourers for Germany's factories. Travelling through Nazi-occupied territories in Europe, he recruited slave labour by force. After the war, he was brought to trial at Nuremberg before the international military tribunal along with other Nazi leaders and was found guilty, on Oct. 1, 1946, of war crimes and crimes against humanity and was sentenced to hang. In the verdict Sauckel was described as being in charge of a program involving deportation for slave labour of 5,000,000 people under cruel and insufferable conditions. He was hanged on Oct. 16, 1946.

Saudi Arabia

See ARABIA.

Savage, Michael Joseph

Savage (1872–1940), New Zealand statesman, was born in Benalla, Australia, March 7, 1872. He left school at the age of 14 and worked successively as a clerk in a store, as a labourer on a sheep ranch and as a miner. In 1900 he became secretary of the Political Labour Council in Victoria and organized a co-operative store. He went to New Zealand in 1907 and became an active leader in the labour movement there. Elected to the house of representatives in 1919, he succeeded to leadership of the Labour party in 1933. In 1935 he became prime minister in the first labour government. The party increased its majority in the elections three years later and Savage continued in power. He died in Wellington, N.Z., March 26, 1940.

Savings Banks

See BANKING.

Sayre, Francis Bowes

Sayre (1885–), U.S. statesman and lawyer, was born April 30, 1885, at South Bethlehem, Pa. He received his A.B. degree from Williams College in 1909 and his LL.B. degree from Harvard University in 1912. In 1913 he married Jessie Woodrow, daughter of President Wilson, at the White House. (She died Jan. 15, 1933). He was a teaching fellow at Harvard Law School (1917–18), and from 1919 to 1934 he remained on Harvard's faculty, becoming director of the university's Institute of Criminal Law.

Sayre was appointed assistant secretary of state by President Roosevelt in 1933 and U.S. high commissioner to the Philippines in 1939. In Manila during the Japanese attack, Sayre lived for two months in the Corregidor fortress. Taken off by a U.S. submarine, he returned to Washington, D.C., in the spring of 1942. In 1944 he was appointed diplomatic adviser to the director general of U.N.R.R.A. Testifying in the postwar Pearl Harbor

inquiry, Sayre introduced in evidence, Dec. 4, 1945, a message from Pres. Roosevelt, dated Nov. 26, 1941, which warned that Japan was planning an attack against Allied outposts in the Pacific and far east.

Scandinavian Literature

The Scandinavian nations maintained and strengthened their literary tradition through the decade 1937–46. Poetry and action are close cousins in the north; invasion and terror redirected the thought and gave new fire to the writing of the 20th century *skalds*.

Norway.—The Norwegian government made Nordahl Grieg a new kind of poet laureate, official inspirer of troops and people. His mind was keen and mature, and he lived and acted with soldiers and sailors; he lost his life in a bombing raid over Berlin in Dec. 1943. Another of the voices of Norway during the early days of World War II was Arnulf Overland, later imprisoned three years by the Germans. His "We Shall Live Through All" was perhaps the greatest poem of the period out of Norway. A third who could put in words that inner strength that kept his country strong was Sigmund Skard. And last but not least in a notable group was Gunnar Reiss-Andersen, who wrote movingly and effectively from exile in Sweden.

Novels and criticism awaited peaceful times, though the night lectures of Francis Bull in the concentration camp at Grini brought heart to his fellow prisoners through his interpretations of Bjørnstjerne Bjørnson and Henrik Ibsen and Henrik Wergeland. Literature was a potent living force, which explains why Nazi sympathizers such as the aged Knut Hamsun were doubly anathema to their people. Others of the older group, such as Sigrid Undset and Fredrick Paasche, spoke out vigorously abroad for their nation, and Halvdan Koht continued his prolific historical writing in the United States. In the early years of World War II some notable works were published: e.g., Johan Bojer's reminiscences, *Prentice Boy*, Johan Falkberget's imaginative *The Bread of Night* and Inge Krokmann's historical *Under the Sign in the Sky*.

Denmark.—In Denmark literature played a role similar to that in Norway, through quite different personalities. The giant of the times was Kaj Munk, pastor and playwright, murdered by the Nazis in 1944; his martyrdom hardened the steel of Danish resistance. In 1942 Munk published *The Spring Comes Gently*, a richly thoughtful study of his own spiritual growth and of the problems of youth. In the same year came out the quickly prohibited *Niels Ebbesen*, pointed drama of the 14th century assassination of a German bully. Fame was won through plays and poetry; influence waxed with sermons which rang a challenge throughout the nation and goaded the invaders into violent action (some published as *The Sword of the Word*).

Karen Blixen (Isak Dinesen) was known for her *Seven Gothic Tales*, and in 1942 published the similar-in-spirit *Winter's Tales*. Martin Andersen Nexø (*Pelle the Conqueror*), had to flee Denmark to U.S.S.R. because of his too great sympathy for the Soviets, but returned and was feted on his 76th birthday. Johannes V. Jensen (*The Long Journey*, etc.), turned in his later years to studies in evolution; in 1943 he celebrated his 70th birthday, and soon thereafter was awarded the Nobel prize—the act itself a Swedish gesture of defiance against the Nazis. Henrik Pontoppidan, last survivor of "the authors of the Modern Awakening," a Nobel winner of 1917, was silent in these latter years. Of the newer group of writers, one of the most brilliant was Mogens Klitgaard, whose *Tragi-Comedy at Nytorv* was an 18th century period piece on sex. Mystical and metaphysical tendencies were represented by

Aage Dons (*Where All Roads Meet*), H. C. Branner (*A Dream about a Woman*) and Tove Ditlevsen (*A Child was Harmed*).

Sweden.—Sweden, untouched physically by invasion, was touched deeply in soul by the surrounding conflict. National sentiment and ideals of Nordic brotherhood appeared in such form as the lyric poetry of Gunnar Mascoll Silfverstolpe (*My Country*), and Pär Lagerkvist (*Song and Battle*). More personal in reaction to the stifling brutality of the day was Karin Boye.

Of the later Swedish writers on the psychological problems of bourgeois life, perhaps the ablest was Olle Hedberg (*Josephine: or Say It with Flowers*, and *What Is the Toy-Chest Sighing?*). A revaluation and re-emphasis on the democratic way of life was seen in Eyvind Johnson's *The Krilon Group*, a powerful political novel. Dramatic in intensity and widely popular was Wilhelm Moberg's *Ride This Night!*, a historical novel of a 17th century peasant uprising. Frans G. Bengtsson's *The Red Serpent* also became a best-seller.

Pär Lagerkvist stood above all contemporary dramatic writers, his *Victory in the Dark* being especially notable. Karl Ragnar Gierow (*The Werewolf*) and Sven Stolpe (*Döbeln*) both gave promise for the future.

During the decade Sweden suffered loss in the death of many of her greats: the beloved Selma Lagerlöf, the historical novelist Verner von Heidenstam, witty Albert Engström, art historian Carl G. Laurin, poets Erik Lindorm, Gunnar Silfverstolpe and Karin Boye and others less well-known abroad.

Iceland.—Iceland, like the other Scandinavian lands, published a great number of translations of American and British authors. Works from sisterlands to the east were adapted, too: Nordahl Grieg's last volume, *Freedom*, was first published in Iceland, and Kaj Munk's *Niels Ebbesen* was first performed there. Iceland's own artists were also productive. Out of the wealth of novels, Halldór Laxness' *Independent People*, historical and interpretive, was noteworthy. In 1942 appeared volume one of Iceland's first real cultural history, *Islenzk Menning*, by Sigurdur Nordal.

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Schacht, Hjalmar Horace Greeley

Schacht (1877-), German financier, economist and politician, was born Jan. 22, 1877, at Tinglev near Flensburg. A student of political economy, he was associated with a number of German banks in high executive positions and was appointed president of the reichsbank in 1923. Because of his opposition to the Young plan, he resigned from the reichsbank in 1930. Generally regarded as a financial "wizard," Schacht was reinstated as president of the reichsbank by Adolf Hitler in 1933. He had actively supported the nazi party before its accession to power and endorsed Hitler's appointment as chancellor.

Schacht instituted the system of exchange control, which bolstered Germany's weak foreign exchange position and facilitated the purchase abroad of raw materials required for the war effort. In 1936 his position as the top authority on German war economics was undermined by Hermann Goering, who became co-ordinator for raw materials and foreign exchange. Schacht opposed Goering's program of economic self-sufficiency. However, Hitler sided with Goer-

ing and on Nov. 16, 1937, Schacht resigned his post as minister of economics and plenipotentiary general for war economy, to which he had been named in 1934.

Thereafter, Schacht emerged in a new role—that of an opponent of "excessive militarization." He presented (Jan. 2, 1939), a report to Hitler urging a sweeping reduction of arms expenditures and establishment of a balanced budget as the only means of preventing inflation. Hitler disagreed and on Jan. 19, 1939, ousted Schacht as president of the reichsbank. Schacht retained his post as minister without portfolio until Jan. 22, 1943, when Hitler forced him out of that position too.

Schacht participated in the abortive plot to assassinate Hitler July 20, 1944. Three days later, he was arrested and confined in a concentration camp until the end of World War II. He was subsequently released by the Allied authorities and on Aug. 29, 1945, was indicted by the International War Crimes tribunal at Nuernberg to stand trial on charges of various war crimes. He was acquitted on Oct. 1, 1946, by the tribunal, which ruled that while he undoubtedly was the central figure in the German rearmament program, rearmament itself was not criminal under the court's charter. The court further stated that there was no evidence to indicate that Schacht carried out this rearmament as part of a nazi plan to wage aggressive war. After his release, Schacht was again arrested, Oct. 7, 1946, by German police at Backnang to stand trial before a German denazification court.

Schizophrenia

See MEDICINE; NERVOUS SYSTEM; PSYCHIATRY.

Schools

See EDUCATION; UNIVERSITIES AND COLLEGES.

Schuschnigg, Kurt von

Schuschnigg (1897-), Austrian statesman, was born Dec. 14, 1897, at Riva (then in Austria, later in Venetia Tridentina, Italy). He served in the Austro-Hungarian forces in World War I, was taken prisoner by the Italians in 1917 and was released after the war. Entering politics in 1927, he held successively the ministries of justice and education in Chancellor Engelbert Dollfuss' government. After becoming chancellor in 1934, he forced the ouster of his vice-chancellor, Prince Ernst von Starhemberg; he also dismissed the interior minister, Herr von Sturmer, assuming that portfolio himself.

As Adolf Hitler exerted pressure for an anschluss, Schuschnigg proclaimed a plebiscite for March 13, 1938, in an effort to rally Austrian opinion for continued independence. Moving quickly to forestall a vote, Hitler marched into Austria on March 12, 1938, and annexed the country. Schuschnigg was promptly jailed as a "traitor" to the "Germanic folk" of Austria. While in prison Schuschnigg, through the intercession of the Catholic Church, was permitted to marry by proxy Countess Vera Fugger-Czernin on June 1, 1938. Later, the Schuschniggs were permitted to reside in a Bavarian village, although still under German custody.

During the final phases of the war, the Schuschniggs were transferred to the Pragser Wildersee concentration camp in the Italian Alps, from which they were liberated in May 1945 by U.S. 5th army troops. They then moved to the Isle of Capri, off Italy. They went to the U.S. in 1947 and Schuschnigg was appointed to the faculty of Fordham university.

856 Schwellenbach, Lewis Baxter

Schwellenbach (1894–), U.S. jurist and cabinet member, was born Sept. 20, 1894, in Superior, Wis. A graduate of the University of Washington, Seattle, he received his LL.B. degree in 1917 and served with the U.S. army as a private during World War I. After the war he returned to Washington, where he was admitted to the bar in 1919. Becoming active in state politics, he was elected in 1934 to the U.S. senate on the Democratic ticket. During his tenure, he supported the administration in both its domestic and foreign policies. He resigned from the senate in Dec. 1940 to become federal judge of Washington state, eastern district.

On May 23, 1945, President Truman named him secretary of labour. The appointment won approval from both the A.F. of L. and the C.I.O., and he assumed office on June 30. In 1945 Secretary Schwellenbach advocated raising the minimum wage law to 65 cents an hour and urged legislation to this end. He also favoured equal pay for women and legislation banning pay differentials based on sex. Throughout 1945 and 1946 the secretary of labour was beset with many vexing problems, including the oil and automobile industry strikes in 1945, the steel strike in 1946 and the two coal walk-outs engineered by John L. Lewis in 1946. He evolved the fact-finding procedure for settlement of strikes and tried his hand at labour mediation, succeeding in some cases, failing in others.

Science, Future Techniques of*

Of what lasting benefit has been man's use of science and of the new instruments which his research brought into existence? First, they have increased his control of his material environment. They have improved his food, his clothing, his shelter; they have increased his security and released him partly from the bondage of bare existence. They have given him increased knowledge of his own biological processes so that he has had a progressive freedom from disease and an increased span of life. They are illuminating the interactions of his physiological and psychological functions, giving the promise of an improved mental health.

Science has provided the swiftest communication between individuals; it has provided a record of ideas and has enabled man to manipulate and to make extracts from that record so that knowledge evolves and endures throughout the life of a race rather than that of an individual.

There is a growing mountain of research. But there is increased evidence that we are being bogged down today as specialization extends. The investigator is staggered by the findings and conclusions of thousands of other workers—conclusions which he cannot find time to grasp, much less to remember, as they appear. Yet specialization becomes increasingly necessary for progress, and the effort to bridge between disciplines is correspondingly superficial.

Professionally our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose. If the aggregate time spent in writing scholarly works and in

reading them could be evaluated, the ratio between these amounts of time might well be startling. Those who conscientiously attempt to keep abreast of current thought, even in restricted fields, by close and continuous reading might well shy away from an examination calculated to show how much of the previous month's efforts could be produced on call. Mendel's concept of the laws of genetics was lost to the world for a generation because his publication did not reach the few who were capable of grasping and extending it; and this sort of catastrophe is undoubtedly being repeated all about us, as truly significant attainments become lost in the mass of the inconsequential.

Science's Need for New Methods of Recording.—The difficulty seems to be, not so much that we publish unduly in view of the extent and variety of present-day interests, but rather that publication has been extended far beyond our present ability to make real use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships.

But there are signs of a change as new and powerful instrumentalities come into use. Photocells capable of seeing things in a physical sense, advanced photography which can record what is seen or even what is not, thermionic tubes capable of controlling potent forces under the guidance of less power than a mosquito uses to vibrate his wings, cathode ray tubes rendering visible an occurrence so brief that by comparison a microsecond is a long time, relay combinations which will carry out involved sequences of movements more reliably than any human operator and thousands of times as fast—there are plenty of mechanical aids with which to effect a transformation in scientific records.

Two centuries ago Leibnitz invented a calculating machine which embodied most of the essential features of recent keyboard devices, but it could not then come into use. The economics of the situation were against it: the labor involved in constructing it, before the days of mass production, exceeded the labor to be saved by its use, since all it could accomplish could be duplicated by sufficient use of pencil and paper. Moreover, it would have been subject to frequent breakdown, so that it could not have been depended upon; for at that time and long after, complexity and unreliability were synonymous.

Charles Babbage, even with remarkably generous support for his time, could not produce his great arithmetical machine. His idea was sound enough, but construction and maintenance costs were then too heavy. Had a Pharaoh been given detailed and explicit designs of an automobile, and had he understood them completely, it would have taxed the resources of his kingdom to have fashioned the thousands of parts for a single car, and that car would have broken down on the first trip to Giza.

Machines with interchangeable parts can now be constructed with great economy of effort. In spite of much complexity, they perform reliably. Witness the humble typewriter, or the movie camera, or the automobile. Electrical contacts have ceased to stick when thoroughly understood. Note the automatic telephone exchange, which has hundreds of thousands of such contacts, and yet is reliable. A spider web of metal, sealed in a thin glass container, a wire heated to brilliant glow, in short, the thermionic tube of radio sets, is made by the hundred million, tossed about in packages, plugged into sockets—and it works! Its gossamer parts, the precise location and alignment

* Reprinted by permission of the copyright owners from the *Atlantic Monthly* for July 1945, where it appeared under the title "As We May Think." Because of the importance of this speculative essay by Dr. Vannevar Bush, which emphasizes the need for making man's vast accumulation of knowledge more accessible to all, and points out potentially practicable ways of meeting that need—the editors of *Britannica* have reproduced the fantasy in full, except for short introductory paragraphs.

involved in its construction, would have occupied a master craftsman of the guild for months; now it is built for thirty cents. The world has arrived at an age of cheap complex devices of great reliability; and something is bound to come of it.

New Uses of Photography.—A record, if it is to be useful to science, must be continuously extended, it must be stored, and above all it must be consulted. Today we make the record conventionally by writing and photography, followed by printing; but we also record on film, on wax disks, and on magnetic wires. Even if utterly new recording procedures do not appear, these present ones are certainly in the process of modification and extension.

Certainly progress in photography is not going to stop. Faster material and lenses, more automatic cameras, finer-grained sensitive compounds to allow an extension of the minicamera idea, are all imminent. Let us project this trend ahead to a logical, if not inevitable, outcome. The camera hound of the future wears on his forehead a lump a little larger than a walnut. It takes pictures 3 millimeters square, later to be projected or enlarged, which after all involves only a factor of 10 beyond present practice. The lens is of universal focus, down to any distance accommodated by the unaided eye, simply because it is of short focal length. There is a built-in photocell on the walnut such as we now have on at least one camera, which automatically adjusts exposure for a wide range of illumination. There is film in the walnut for a hundred exposures, and the spring for operating its shutter and shifting its film is wound once for all when the film clip is inserted. It produces its results in full color. It may well be stereoscopic, and record with two spaced glass eyes, for striking improvements in stereoscopic technique are just around the corner.

The cord which trips its shutter may reach down a man's sleeve within easy reach of his fingers. A quick squeeze, and the picture is taken. On a pair of ordinary glasses is a square of fine lines near the top of one lens, where it is out of the way of ordinary vision. When an object appears in that square, it is lined up for its picture. As the scientist of the future moves about the laboratory or the field, every time he looks at something worthy of the record, he trips the shutter and in it goes, without even an audible click. Is this all fantastic? The only fantastic thing about it is the idea of making as many pictures as would result from its use.

Will there be dry photography? It is already here in two forms. When Mathew Brady made his Civil War pictures, the plate had to be wet at the time of exposure. Now it has to be wet during development instead. In the future perhaps it need not be wetted at all. There have long been films impregnated with diazo dyes which form a picture without development, so that it is already there as soon as the camera has been operated. An exposure to ammonia gas destroys the unexposed dye, and the picture can then be taken out into the light and examined. The process is now slow, but someone may speed it up, and it has no grain difficulties such as now keep photographic researchers busy. Often it would be advantageous to be able to snap the camera and to look at the picture immediately.

Another process now in use is also slow, and more or less clumsy. For fifty years impregnated papers have been used which turn dark at every point where an electrical contact touches them, by reason of the chemical change thus produced in an iodine compound included in the paper. They have been used to make records, for a pointer moving across them can leave a trail behind. If

the electrical potential on the pointer is varied as it moves, the line becomes light or dark in accordance with the potential.

This scheme is now used in facsimile transmission. The pointer draws a set of closely spaced lines across the paper one after another. As it moves, its potential is varied in accordance with a varying current received over wires from a distant station, where these variations are produced by a photocell which is similarly scanning a picture. At every instant the darkness of the line being drawn is made equal to the darkness of the point on the picture being observed by the photocell. Thus, when the whole picture has been covered, a replica appears at the receiving end.

A scene itself can be just as well looked over line by line by the photocell in this way as can a photograph of the scene. This whole apparatus constitutes a camera, with the added feature, which can be dispensed with if desired, of making its picture at a distance. It is slow, and the picture is poor in detail. Still, it does give another process of dry photography, in which the picture is finished as soon as it is taken.

It would be a brave man who would predict that such a process will always remain clumsy, slow, and faulty in detail. Television equipment today transmits sixteen reasonably good pictures a second, and it involves only two essential differences from the process described above. For one, the record is made by a moving beam of electrons rather than a moving pointer, for the reason that an electron beam can sweep across the picture very rapidly indeed. The other difference involves merely the use of a screen which glows momentarily when the electrons hit, rather than a chemically treated paper or film which is permanently altered. This speed is necessary in television, for motion pictures rather than stills are the object.

Use chemically treated film in place of the glowing screen, allow the apparatus to transmit one picture only rather than a succession, and a rapid camera for dry photography results. The treated film needs to be far faster in action than present examples, but it probably could be. More serious is the objection that this scheme would involve putting the film inside a vacuum chamber, for electron beams behave normally only in such a rarefied environment. This difficulty could be avoided by allowing the electron beam to play on one side of a partition, and by pressing the film against the other side, if this partition were such as to allow the electrons to go through perpendicular to its surface, and to prevent them from spreading out sideways. Such partitions, in crude form, could certainly be constructed, and they will hardly hold up the general development.

Like dry photography, microphotography still has a long way to go. The basic scheme of reducing the size of the record, and examining it by projection rather than directly, has possibilities too great to be ignored. The combination of optical projection and photographic reduction is already producing some results in microfilm for scholarly purposes, and the potentialities are highly suggestive. Today, with microfilm, reductions by a linear factor of 20 can be employed and still produce full clarity when the material is re-enlarged for examination. The limits are set by the graininess of the film, the excellence of the optical system, and the efficiency of the light sources employed. All of these are rapidly improving.

Assume a linear ratio of 100 for future use. Consider film of the same thickness as paper, although thinner film will certainly be usable. Even under these conditions

there would be a total factor of 10,000 between the bulk of the ordinary record on books, and its microfilm replica. The *Encyclopædia Britannica* could be reduced to the volume of a matchbox. A library of a million volumes could be compressed into one end of a desk. If the human race has produced since the invention of movable type a total record, in the form of magazines, newspapers, books, tracts, advertising blurbs, correspondence, having a volume corresponding to a billion books, the whole affair, assembled and compressed, could be lugged off in a moving van. Mere compression, of course, is not enough; one needs not only to make and store a record but also be able to consult it, and this aspect of the matter comes later. Even the modern great library is not generally consulted; it is nibbled at by a few.

Compression is important, however, when it comes to costs. The material for the microfilm *Britannica* would cost a nickel, and it could be mailed anywhere for a cent. What would it cost to print a million copies? To print a sheet of newspaper, in a large edition, costs a small fraction of a cent. The entire material of the *Britannica* in reduced microfilm form would go on a sheet eight and one-half by eleven inches. Once it is available, with the photographic reproduction methods of the future, duplicates in large quantities could probably be turned out for a cent apiece beyond the cost of materials. The preparation of the original copy? That introduces the next aspect of the subject.

Mechanical Reproduction of Spoken Thought.—To make the record, we now push a pencil or tap a typewriter. Then comes the process of digestion and correction, followed by an intricate process of typesetting, printing, and distribution. To consider the first stage of the procedure, will the author of the future cease writing by hand or typewriter and talk directly to the record? He does so indirectly, by talking to a stenographer or a wax cylinder; but the elements are all present if he wishes to have his talk directly produce a typed record. All he needs to do is to take advantage of existing mechanisms and to alter his language.

At a recent World Fair a machine called a Voder was shown. A girl stroked its keys and it emitted recognizable speech. No human vocal chords entered into the procedure at any point; the keys simply combined some electrically produced vibrations and passed these on to a loud-speaker. In the Bell Laboratories there is the converse of this machine, called a Vocoder. The loud-speaker is replaced by a microphone, which picks up sound. Speak to it, and the corresponding keys move. This may be one element of the postulated system.

The other element is found in the stenotype, that somewhat disconcerting device encountered usually at public meetings. A girl strokes its keys languidly and looks about the room and sometimes at the speaker with a disquieting gaze. From it emerges a typed strip which records in a phonetically simplified language a record of what the speaker is supposed to have said. Later this strip is re-typed into ordinary language, for in its nascent form it is intelligible only to the initiated. Combine these two elements, let the Vocoder run the stenotype, and the result is a machine which types when talked to.

Our present languages are not especially adapted to this sort of mechanization, it is true. It is strange that the inventors of universal languages have not seized upon the idea of producing one which better fitted the technique for transmitting and recording speech. Mechaniza-

tion may yet force the issue, especially in the scientific field; whereupon scientific jargon would become still less intelligible to the layman.

One can now picture a future investigator in his laboratory. His hands are free, and he is not anchored. As he moves about and observes, he photographs and comments. Time is automatically recorded to tie the two records together. If he goes into the field, he may be connected by radio to his recorder. As he ponders over his notes in the evening, he again talks his comments into the record. His typed record, as well as his photographs, may both be in miniature, so that he projects them for examination.

Mechanizing Simple, Routine Thought.—Much needs to occur, however, between the collection of data and observations, the extraction of parallel material from the existing record, and the final insertion of new material into the general body of the common record. For mature thought there is no mechanical substitute. But creative thought and essentially repetitive thought are very different things. For the latter there are, and may be, powerful mechanical aids.

Adding a column of figures is a repetitive thought process, and it was long ago properly relegated to the machine. True, the machine is sometimes controlled by a keyboard, and thought of a sort enters in reading the figures and poking the corresponding keys, but even this is avoidable. Machines have been made which will read typed figures by photocells and then depress the corresponding keys; these are combinations of photocells for scanning the type, electric circuits for sorting the consequent variations, and relay circuits for interpreting the result into the action of solenoids to pull the keys down.

All this complication is needed because of the clumsy way in which we have learned to write figures. If we recorded them positionally, simply by the configuration of a set of dots on a card, the automatic reading mechanism would become comparatively simple. In fact, if the dots are holes, we have the punched-card machine long ago produced by Herman Hollerith for the purposes of the census, and now used throughout business. Some types of complex businesses could hardly operate without these machines.

Adding is only one operation. To perform arithmetical computation involves also subtraction, multiplication, and division, and in addition some method for temporary storage of results, removal from storage for further manipulation, and recording of final results by printing. Machines for these purposes are now of two types: keyboard machines for accounting and the like, manually controlled for the insertion of data, and usually automatically controlled as far as the sequence of operations is concerned; and punched-card machines in which separate operations are usually delegated to a series of machines, and the cards then transferred bodily from one to another. Both forms are very useful; but as far as complex computations are concerned, both are still in embryo.

Rapid electrical counting appeared soon after the physicists found it desirable to count cosmic rays. For their own purposes the physicists promptly constructed thermionic-tube equipment capable of counting electrical impulses at the rate of 100,000 a second. The advanced arithmetical machines of the future will be electrical in nature, and they will perform at 100 times present speeds, or more.

Moreover, they will be far more versatile than present commercial machines, so that they may readily be adapted

for a wide variety of operations. They will be controlled by a control card or film, they will select their own data and manipulate it in accordance with the instructions thus inserted, they will perform complex arithmetical computations at exceedingly high speeds, and they will record results in such form as to be readily available for distribution or for later further manipulation. Such machines will have enormous appetites. One of them will take instructions and data from a whole roomful of girls armed with simple keyboard punches, and will deliver sheets of computed results every few minutes. There will always be plenty of things to compute in the detailed affairs of millions of people doing complicated things.

The repetitive processes of thought are not confined, however, to matters of arithmetic and statistics. In fact, every time one combines and records facts in accordance with established logical processes, the creative aspect of thinking is concerned only with the selection of the data and the process to be employed, and the manipulation thereafter is repetitive in nature and hence a fit matter to be relegated to the machines. Not so much has been done along these lines, beyond the bounds of arithmetic, as might be done, primarily because of the economics of the situation. The needs of business, and the extensive market obviously waiting, assured the advent of mass-produced arithmetical machines just as soon as production methods were sufficiently advanced.

With machines for advanced analysis no such situation existed; for there was and is no extensive market; the users of advanced methods of manipulating data are a very small part of the population. There are, however, machines for solving differential equations—and functional and integral equations, for that matter. There are many special machines, such as the harmonic synthesizer which predicts the tides. There will be many more, appearing certainly first in the hands of the scientist and in small numbers.

If scientific reasoning were limited to the logical processes of arithmetic, we should not get far in our understanding of the physical world. One might as well attempt to grasp the game of poker entirely by the use of the mathematics of probability. The abacus, with its beads strung on parallel wires, led the Arabs to positional numeration and the concept of zero many centuries before the rest of the world; and it was a useful tool—so useful that it still exists.

It is a far cry from the abacus to the modern keyboard accounting machine. It will be an equal step to the arithmetical machine of the future. But even this new machine will not take the scientist where he needs to go. Relief must be secured from laborious detailed manipulation of higher mathematics as well, if the users of it are to free their brains for something more than repetitive detailed transformations in accordance with established rules. A mathematician is not a man who can readily manipulate figures; often he can not. He is not even a man who can readily perform the transformations of equations by the use of calculus. He is primarily an individual who is skilled in the use of symbolic logic on a high plane, and especially he is a man of intuitive judgment in the choice of the manipulative processes he employs.

All else he should be able to turn over to his mechanism, just as confidently as he turns over the propelling of his car to the intricate mechanism under the hood. Only then will mathematics be practically effective in bringing the growing knowledge of atomistics to the useful solution of the advanced problems of chemistry, metallurgy, and

biology. For this reason there will come more machines to handle advanced mathematics for the scientist. Some of them will be sufficiently bizarre to suit the most fastidious connoisseur of the present artifacts of civilization.

Thinking Machines.—The scientist, however, is not the only person who manipulates data and examines the world about him by the use of logical processes, although he sometimes preserves this appearance by adopting into the fold anyone who becomes logical, much in the manner in which a British labor leader is elevated to knighthood. Whenever logical processes of thought are employed—that is, whenever thought for a time runs along an accepted groove—there is an opportunity for the machine. Formal logic used to be a keen instrument in the hands of the teacher in his trying of students' souls. It is readily possible to construct a machine which will manipulate premises in accordance with formal logic, simply by the clever use of relay circuits. Put a set of premises into such a device and turn the crank, and it will readily pass out conclusion after conclusion, all in accordance with logical law, and with no more slips than would be expected of a keyboard adding machine.

Logic can become enormously difficult, and it would undoubtedly be well to produce more assurance in its use. The machines for higher analysis have usually been equation solvers. Ideas are beginning to appear for equation transformers, which will rearrange the relationship expressed by an equation in accordance with strict and rather advanced logic. Progress is inhibited by the exceedingly crude way in which mathematicians express their relationships. They employ a symbolism which grew like Topsy and has little consistency; a strange fact in that most logical field.

A new symbolism, probably positional, must apparently precede the reduction of mathematical transformations to machine processes. Then, on beyond the strict logic of the mathematician, lies the application of logic in everyday affairs. We may some day click off arguments on a machine with the same assurance that we now enter sales on a cash register. But the machine of logic will not look like a cash register, even of the streamlined model.

Selection Devices.—So much for the manipulation of ideas and their insertion into the record. Thus far we seem to be worse off than before—for we can enormously extend the record; yet even in its present bulk we can hardly consult it. This is a much larger matter than merely the extraction of data for the purposes of scientific research; it involves the entire process by which man profits by his inheritance of acquired knowledge. The prime action of use is selection, and here we are halting indeed. There may be millions of fine thoughts, and the account of the experience on which they are based, all encased within stone walls of acceptable architectural form; but if the scholar can get at only one a week by diligent search, his syntheses are not likely to keep up with the current scene.

Selection, in this broad sense, is a stone adze in the hands of a cabinetmaker. Yet, in a narrow sense and in other areas, something has already been done mechanically on selection. The personnel officer of a factory drops a stack of a few thousand employee cards into a selecting machine, sets a code in accordance with an established convention, and produces in a short time a list of all employees who live in Trenton and know Spanish. Even such devices are much too slow when it comes, for example, to matching a set of fingerprints with one of five million

on file. Selection devices of this sort will soon be speeded up from their present rate of reviewing data at a few hundred a minute. By the use of photocells and microfilm they will survey items at the rate of a thousand a second, and will print out duplicates of those selected.

This process, however, is simple selection: it proceeds by examining in turn every one of a large set of items, and by picking out those which have certain specified characteristics. There is another form of selection best illustrated by the automatic telephone exchange. You dial a number and the machine selects and connects just one of a million possible stations. It does not run over them all. It pays attention only to a class given by a first digit, then only to a subclass of this given by the second digit, and so on; and thus proceeds rapidly and almost unerringly to the selected station. It requires a few seconds to make the selection, although the process could be speeded up if increased speed were economically warranted. If necessary, it could be made extremely fast by substituting thermionic-tube switching for mechanical switching, so that the full selection could be made in one one-hundredth of a second. No one would wish to spend the money necessary to make this change in the telephone system, but the general idea is applicable elsewhere.

Take the prosaic problem of the great department store. Every time a charge sale is made, there are a number of things to be done. The inventory needs to be revised, the salesman needs to be given credit for the sale, the general accounts need an entry, and, most important, the customer needs to be charged. A central records device has been developed in which much of this work is done conveniently. The salesman places on a stand the customer's identification card, his own card, and the card taken from the article sold—all punched cards. When he pulls a lever, contacts are made through the holes, machinery at a central point makes the necessary computations and entries, and the proper receipt is printed for the salesman to pass to the customer.

But there may be ten thousand charge customers doing business with the store, and before the full operation can be completed someone has to select the right card and insert it at the central office. Now rapid selection can slide just the proper card into position in an instant or two, and return it afterward. Another difficulty occurs, however. Someone must read a total on the card, so that the machine can add its computed item to it. Conceivably the cards might be of the dry photography type I have described. Existing totals could then be read by photocell, and the new total entered by an electron beam.

The cards may be in miniature, so that they occupy little space. They must move quickly. They need not be transferred far, but merely into position so that the photocell and recorder can operate on them. Positional dots can enter the data. At the end of the month a machine can readily be made to read these and to print an ordinary bill. With tube selection, in which no mechanical parts are involved in the switches, little time need be occupied in bringing the correct card into use—a second should suffice for the entire operation. The whole record on the card may be made by magnetic dots on a steel sheet if desired, instead of dots to be observed optically, following the scheme by which Valdemar Poulsen long ago put speech on a magnetic wire. This method has the advantage of simplicity and ease of erasure. By using photography, however, one can arrange to project the record in enlarged form, and at a distance by using

the process common in television equipment.

One can consider rapid selection of this form, and distant projection for other purposes. To be able to key one sheet of a million before an operator in a second or two, with the possibility of then adding notes thereto, is suggestive in many ways. It might even be of use in libraries, but that is another story. At any rate, there are now some interesting combinations possible. One might, for example, speak to a microphone, in the manner described in connection with the speech-controlled typewriter, and thus make his selections. It would certainly beat the usual file clerk.

The "Memex"—a Machine Filer of Thoughts and Ideas.—The real heart of the matter of selection, however, goes deeper than a lag in the adoption of mechanisms by libraries, or a lack of development of devices for their use. Our ineptitude in getting at the record is largely caused by the artificiality of systems of indexing. When data of any sort are placed in storage, they are filed alphabetically or numerically, and information is found (when it is) by tracing it down from subclass to subclass. It can be in only one place, unless duplicates are used; one has to have rules as to which path will locate it, and the rules are cumbersome. Having found one item, moreover, one has to emerge from the system and re-enter on a new path.

The human mind does not work that way. It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade, items are not fully permanent, memory is transitory. Yet the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature.

Man can not hope fully to duplicate this mental process artificially, but he certainly ought to be able to learn from it. In minor ways he may even improve, for his records have relative permanency. The first idea, however, to be drawn from the analogy concerns selection. Selection by association, rather than by indexing, may yet be mechanized. One can not hope thus to equal the speed and flexibility with which the mind follows an associative trail, but it should be possible to beat the mind decisively in regard to the permanence and clarity of the items resurrected from storage.

Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.

It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers. Otherwise it looks like an ordinary desk.

In one end is the stored material. The matter of bulk is well taken care of by improved microfilm. Only a small part of the interior of the memex is devoted to storage, the rest to mechanism.

Yet if the user inserted 5000 pages of material a day it would take him hundreds of years to fill the repository, so

he can be profligate and enter material freely.

Most of the memex contents are purchased on micro-film ready for insertion. Books of all sorts, pictures, current periodicals, newspapers, are thus obtained and dropped into place. Business correspondence takes the same path. And there is provision for direct entry. On the top of the memex is a transparent platen. On this are placed longhand notes, photographs, memoranda, all sorts of things. When one is in place, the depression of a lever causes it to be photographed onto the next blank space in a section of the memex film, dry photography being employed.

There is, of course, provision for consultation of the record by the usual scheme of indexing. If the user wishes to consult a certain book, he taps its code on the keyboard, and the title page of the book promptly appears before him, projected onto one of his viewing positions. Frequently-used codes are mnemonic, so that he seldom consults his code book; but when he does, a single tap of a key projects it for his use. Moreover, he has supplemental levers. On deflecting one of these levers to the right he runs through the book before him, each page in turn being projected at a speed which just allows a recognizing glance at each. If he deflects it further to the right, he steps through the book 10 pages at a time; still further at 100 pages at a time. Deflection to the left gives him the same control backwards.

A special button transfers him immediately to the first page of the index. Any given book of his library can thus be called up and consulted with far greater facility than if it were taken from a shelf. As he has several projection positions, he can leave one item in position while he calls up another. He can add marginal notes and comments, taking advantage of one possible type of dry photography, and it could even be arranged so that he can do this by a stylus scheme, such as is now employed in the telautograph seen in railroad waiting rooms, just as though he had the physical page before him.

Uses of the "Memex".—All this is conventional, except for the projection forward of present-day mechanisms and gadgetry. It affords an immediate step, however, to associative indexing, the basic idea of which is a provision whereby any item may be caused at will to select immediately and automatically another. This is the essential feature of the memex. The process of tying two items together is the important thing.

When the user is building a trail, he names it, inserts the name in his code book, and taps it out on his keyboard. Before him are the two items to be joined, projected onto adjacent viewing positions. At the bottom of each there are a number of blank code spaces, and a pointer is set to indicate one of these on each item. The user taps a single key, and the items are permanently joined. In each code space appears the code word. Out of view, but also in the code space, is inserted a set of dots for photocell viewing; and on each item these dots by their positions designate the index number of the other item.

Thereafter, at any time, when one of these items is in view, the other can be instantly recalled merely by tapping a button below the corresponding code space. Moreover, when numerous items have been thus joined together to form a trail, they can be reviewed in turn, rapidly or slowly, by deflecting a lever like that used for turning the pages of a book. It is exactly as though the physical items had been gathered together from widely separated sources and bound together to form a new book. It is more than this, for any item can be joined

into numerous trails.

The owner of the memex, let us say, is interested in the origin and properties of the bow and arrow. Specifically he is studying why the short Turkish bow was apparently superior to the English long bow in the skirmishes of the Crusades. He has dozens of possibly pertinent books and articles in his memex. First he runs through an encyclopaedia, finds an interesting but sketchy article, leaves it projected. Next, in a history, he finds another pertinent item, and ties the two together. Thus he goes, building a trail of many items. Occasionally he inserts a comment of his own, either linking it into the main trail or joining it by a side trail to a particular item. When it becomes evident that the elastic properties of available materials had a great deal to do with the bow, he branches off on a side trail which takes him through textbooks on elasticity and tables of physical constants. He inserts a page of longhand analysis of his own. Thus he builds a trail of his interest through the maze of materials available to him.

And his trails do not fade. Several years later, his talk with a friend turns to the queer ways in which a people resist innovations, even of vital interest. He has an example, in the fact that the outranged Europeans still failed to adopt the Turkish bow. In fact he has a trail on it. A touch brings up the code book. Tapping a few keys projects the head of the trail. A lever runs through it at will, stopping at interesting items, going off on side excursions. It is an interesting trail, pertinent to the discussion. So he sets a reproducer in action, photographs the whole trail out, and passes it to his friend for insertion in his own memex, there to be linked into the more general trail.

Wholly new forms of encyclopaedias will appear, ready-made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified. The lawyer has at his touch the associated opinions and decisions of his whole experience, and of the experience of friends and authorities. The patent attorney has on call the millions of issued patents, with familiar trails to every point of his client's interest. The physician, puzzled by a patient's reactions, strikes the trail established in studying an earlier similar case, and runs rapidly through analogous case histories, with side references to the classics for the pertinent anatomy and histology. The chemist, struggling with the synthesis of an organic compound, has all the chemical literature before him in his laboratory, with trails following the analogies of compounds, and side trails to their physical and chemical behavior.

The historian, with a vast chronological account of a people, parallels it with a skip trail which stops only on the salient items, and can follow at any time contemporary trails which lead him all over civilization at a particular epoch. There is a new profession of trail blazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record. The inheritance from the master becomes, not only his additions to the world's record, but for his disciples the entire scaffolding by which they were erected.

Thus science may implement the ways in which man produces, stores, and consults the record of the race. It might be striking to outline the instrumentalities of the future more spectacularly, rather than to stick closely to methods and elements now known and undergoing rapid development, as has been done here. Technical diffi-

862 culties of all sorts have been ignored, certainly, but also ignored are means as yet unknown which may come any day to accelerate technical progress as violently as did the advent of the thermionic tube. In order that the picture may not be too commonplace, by reason of sticking to present-day patterns, it may be well to mention one such possibility, not to prophesy but merely to suggest, for prophecy based on extension of the known has substance, while prophecy founded on the unknown is only a doubly involved guess.

All our steps in creating or absorbing material of the record proceed through one of the senses—the tactile when we touch keys, the oral when we speak or listen, the visual when we read. Is it not possible that some day the path may be established more directly?

We know that when the eye sees, all the consequent information is transmitted to the brain by means of electrical vibrations in the channel of the optic nerve. This is an exact analogy with the electrical vibrations which occur in the cable of a television set: they convey the picture from the photocells which see it to the radio transmitter from which it is broadcast. We know further that if we can approach that cable with the proper instruments, we do not need to touch it; we can pick up those vibrations by electrical induction and thus discover and reproduce the scene which is being transmitted, just as a telephone wire may be tapped for its message.

The impulses which flow in the arm nerves of a typist convey to her fingers the translated information which reaches her eye or ear, in order that the fingers may be caused to strike the proper keys. Might not these currents be intercepted, either in the original form in which information is conveyed to the brain, or in the marvelously metamorphosed form in which they then proceed to the hand?

By bone conduction we already introduce sounds into the nerve channels of the deaf in order that they may hear. Is it not possible that we may learn to introduce them without the present cumbersomeness of first transforming electrical vibrations to mechanical ones, which the human mechanism promptly transforms back to the electrical form? With a couple of electrodes on the skull the encephalograph now produces pen-and-ink traces which bear some relation to the electrical phenomena going on in the

brain itself. True, the record is unintelligible, except as it points out certain gross malfunctioning of the cerebral mechanism; but who would now place bounds on where such a thing may lead?

In the outside world, all forms of intelligence, whether of sound or sight, have been reduced to the form of varying currents in an electric circuit in order that they may be transmitted. Inside the human frame exactly the same sort of process occurs. Must we always transform to mechanical movements in order to proceed from one electrical phenomenon to another? It is a suggestive thought, but it hardly warrants prediction without losing touch with reality and immediateness.

Presumably man's spirit should be elevated if he can better review his shady past and analyze more completely and objectively his present problems. He has built a civilization so complex that he needs to mechanize his records more fully if he is to push his experiment to its logical conclusion and not merely become bogged down part way there by overtaxing his limited memory. His excursions may be more enjoyable if he can reacquire the privilege of forgetting the manifold things he does not need to have immediately at hand, with some assurance that he can find them again if they prove important.

The applications of science have built man a well-supplied house, and are teaching him to live healthily therein. They have enabled him to throw masses of people against one another with cruel weapons. They may yet allow him truly to encompass the great record and to grow in the wisdom of race experience. He may perish in conflict before he learns to wield that record for his true good.

Yet, in the application of science to the needs and desires of man, it would seem to be a singularly unfortunate stage at which to terminate the process, or to lose hope as to the outcome.

(V. Bu.)

Scientific Research and Development, Office of

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Scotland

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